THE GLASS INDUSTRY

VOLUME 26, NUMBER 9, SEPTEMBER, 1945

A. S. T. M. DEFINITION OF GLASS

by S. R. SCHOLES

The American Society for Testing Materials is now publishing a definition of the term GLASS. Issued in 1941 as a tentative standard by Sub-Committee I, Committee C-14, A.S.T.M. on Glass and Glass Products, it was revised in 1945 by the same committee.

As background it is pertinent to note that the scope of Committee C-14 is *"The development of nomenclature and method of analysis and testing of glass both as such and as specific products."*

On the membership roster are 50 to 60 members and 14 consulting members representing firms, associations, societies and other committees, classified in accord with A.S.T.M. procedure as Consumers, Producers and General Interest members. In an organization such as A.S.T.M. which covers so many different materials and products it is recognized that interest in any one material is not confined to the committee specializing in that field. Hence there is an established Standing Committee, E-8, on Nomenclature and Definitions, the scope of which is prescribed in these words: *"To aid and advise the standing committees in the preparation of nomenclature and definitions; in the correlation of similar nomenclature and definitions in different committees; and in instituting cooperation between standing committees in matters relating to nomenclature and definitions, by the creation of subcommittees of Committee E-8 or otherwise, especially on matters of common interest to a number of standing committees; to encourage, secure and promote, with the approval of the Executive Committee, cooperation in the preparation of nomenclature and definitions between standing committees of this Society and the committees of other societies and associations."*

Committee E-8 assisted the Sub-Committee of C-14 by appointing a Sub-Committee on the Definition of Glass, composed of representatives from various A.S.T.M. Committees as follows:

C-1 Cementitious, Ceramic, Concrete and Masonry
C-5 Fire Tests of Materials and Construction
C-14 Glass and Glass Products
C-15 Manufactured Masonry Units
D-9 Electrical Insulating Materials
D-13 Textile Materials
D-20 Plastics

In the preparation of the final draft of the definition, this Sub-Committee of E-8 was very helpful with advice and criticism. The definition that follows has been approved by this Sub-Committee; E-10 on Standards, unanimously by C-14, and by over 90 per cent of the members of the Glass Division, American Ceramic Society, who voted by letter ballot.

[1] F. W. Preston, *Glass Ind.*, Feb., 1944, p. 61.

A.S.T.M. Designation: C162- 45T

Glass.—Glass is an inorganic product of fusion which has cooled to a rigid condition without crystallizing.

(a) Glass is typically hard and brittle, and has a conchoidal fracture. It may be colorless or colored, and transparent to opaque. Masses or bodies of glass may be made colored, translucent, or opaque by the presence of dissolved, amorphous, or crystalline material.

(b) When a specific kind of glass is indicated, such descriptive terms as flint glass, barium glass, and window glass should be used following the basic definition, but the qualifying term is to be used as understood by trade custom.

(c) Objects made of glass are loosely and popularly referred to as glass: such as glass for a tumbler, a barometer, a window, a magnifier, or a mirror.

The deliberations of the committee that formulated the definition extended over a period of several years. Former definitions of glass were examined, as they appeared in dictionaries, encyclopedias, and books on glass, old and new. The material and its name are both so old and so established in the very story of civilization that defining it is no easy matter. Moreover, the apparent simplicity of the word prevented following the rule that a definition should be made in simpler terms than the word defined. A recent quasi-serious article[1] despairs of an adequate definition, because glass means different things to different people. From the point of view of those who deal with glass as an engineering material, however, the term does have a narrow significance.

Such is the point of view of the A.S.T.M. This group of technologists, engineers, manufacturers, and users of all sorts of products is interested in specifying what a material is; a standard test or specification then applies without misunderstanding. This Society would not require recitation of the multitude of different oxide compositions that are melted to make commercial glasses; it would be indifferent to the physical chemist's dictum that a glass is an under-cooled liquid; it would have small interest in temperature-viscosity relationships; and, however clearly the X-ray physicist may show that a certain type of atomic co-ordination makes possible the very glassiness of glass, the explanation is unimportant beside the facts concerning its fundamental character and properties.

The essentials of the definition are in its opening sentence: "Glass is an inorganic product of fusion which has cooled to a rigid condition without crystallizing." The word "inorganic" is chosen to include earthy materials and to exclude organic materials, or compounds of carbon. If only the most common glasses were to be

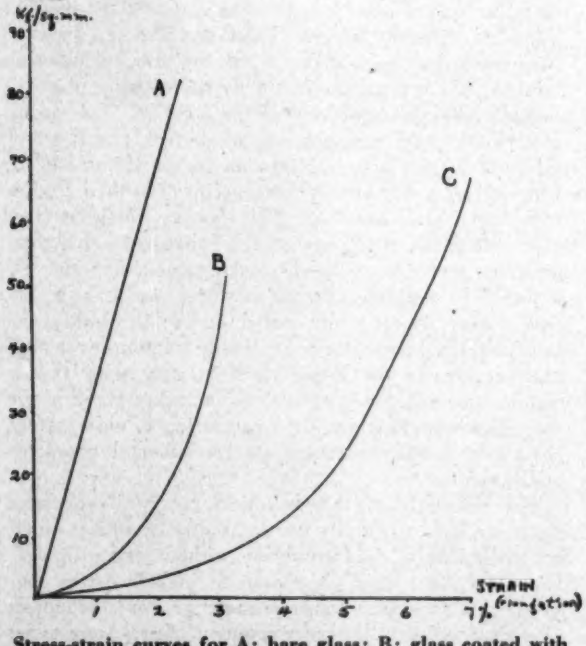
(*Continued on page* 438)

MECHANICAL PROPERTIES OF BARE AND COATED GLASS FIBRES

An interesting paper on this subject, by Miss N. Krotova has recently been published in *Russian Journal of Technical Physics, 14*,455.1944.

For many applications it would be advantageous to have glass fibres with a larger extensibility (total elongation). Several patents (I. G. Farbenindustrie, French Pat. 847037; Oct. 2, 1939; Algem. Kunst Maats., Brit. Pat. 524051; July 29, 1940) have been taken in which the achievement of this goal is claimed by coating the fibres with a thin film of a natural or synthetic resin. Miss Krotova investigated the effect of coatings on the stress-strain curve of glass fibres.

The apparatus used consisted of a steel band to which the lower end of the fibre was attached and a movable clamp in which the upper end was fixed. When the clamp was gradually raised, the band was bent; the corresponding bending force (i.e. the force extending the fibre) was determined using a calibration chart. The extension was measured to the nearest 0.001 mm. The difficult problem of fixing thin and brittle fibres in the clamps was solved in the following way. A piece of cardboard was cut across one half of its length, and the fibre was glued to the board above and below the cut by means of Mendeleef wax. Then the board was gripped into the clamps, the other half of it cut as well, and the machine started. The extension of the cardboard and the slipping out of the fibre from the blob of wax could be neglected. An exact adjustment of the cardboards (one above the other) was essential to avoid fibres breaking at the wax blob.



Stress-strain curves for A: bare glass; B: glass coated with gelatin; C: glass coated with glyptal resin.

The fibres consisted of an "ordinary soda-lime glass" (the composition is not revealed in the original paper). Their diameter was determined microscopically at a magnification of 280, and fibres having diameters of 20μ (=0.0008 inch.) were selected. The length of the specimens between the wax blobs was about 5 mm. (0.2 inch).

The coating usually was performed in this way. Fibres, many at a time, were fixed with a cement on a glass frame in a parallel position. The frame with fibres was dipped into a Petri dish with alcohol, then into a Petri dish with an alcoholic solution of the resin, then dried, dipped again into the resin solution, and dried again. If necessary, the film thus obtained was cured by heating the frame with coated fibres to 140-150 deg. C (284-302 deg. F). The thickness of the cured coating was less than 1μ (=0.00004 inch.).

Bare glass fibres gave a linear relation between stress and strain, see curve A in the Fig. They were perfectly elastic; the deformations corresponding to a given tension were independent of the previous tensions. The average values from 80 determinations were for ultimate tensile strength 86 kg./sq. mm. (=120,000 lb./sq. in.), for total elongation 2.5 per cent, and for Young's modulus of elasticity 3,800 kg./sq. mm. (=5.3 x 10^6 lb./sq. in.).

The properties of the coated films depended on the coating.

Glass fibres coated with rubber ("smoked sheets") which but poorly adhered to glass, behaved similarly to bare fibres. The relation between strain and stress was linear, and Young's modulus was 3,300 kg./sq. mm. (=4.6 x 10^6 lb./sq. in.).

When fibres were coated with other polymer materials, e.g., with gelatin (afterwards tanned), with a glyptal, a urea-formaldehyde, or a vinylite resin, their mechanical properties changed in the direction of those of organic high-polymer fibres, see curves B and C in the Fig. Hooke's law did not hold for coated fibres; their total elongation was greater and tensile strength usually smaller than those of bare filaments. However, the elasticity remained perfect, and the stress-strain curves for increasing and for decreasing stress were identical. The effect produced by a coating seemed to depend on its thickness; a (double) coat from a 28 per cent glyptal resin solution (curve C) changed the mechanical properties of a fibre more than did a (double) coat from a 5 per cent solution. Of all the stress-strain curves of coated fibres those for coatings of chlorinated polychlorovinyl deviated most from the curves for bare fibres; their total elongation was considerable (over 7 per cent) and the ultimate tensile strength (78 kg./sq. mm.) was only a little smaller than that of bare fibres.

Coating with resin made the fibres more uniform in respect to their mechanical properties. That could be shown by statistical analysis of the experimental data.

(*Continued on page* 440)

THE FRENCH GLASS INDUSTRY 1940-1945

Present efforts to reach 200 per cent of 1938 productions are being hindered by shortages of labor, fuel and transportation. 500,000,000 square feet of window glass and 1,000,000,000 containers are needed immediately.

The glass industry of France is now engaged in a struggle to recover from the most trying period of its history. Reduced to nearly one-third of their capacity in the final months of German occupation, French glass plants were at a complete standstill when, by the day of liberation, the railroad and trucking systems had been destroyed, the coal mines idle, and most of the workmen dislocated.

The friends of France and glass technologists in this country follow this struggle with profound sympathy and interest. According to the latest reports received, approximately one-half of the production rate of glass in 1938 had been reached in May, 1945, a ratio which is about of the order of the present coal production index.

The first goal of the endeavors of French glass factories is twice the production of 1938 or about 1,000,000 tons of glass. This seemingly ambitious figure is necessitated by the vast amount of destruction. 500,000,000 square feet of window glass and 1,000,000,000 containers are needed immediately.

The quantity of glass produced in 1938 was about 500,000 tons. Attaining the preliminary goal of 1,000,000 tons will depend largely on the acquisition of fuel supplies. The domestic coal production of France, for instance, is now about 20,000,000 tons per year instead of the 40,000,000 before the war. Allied relief at this time amounts to only 300,000 tons per month. While an accelerated rate will, in part, follow the mobilization of the Ruhr production for the reconstruction of France, it must be borne in mind, however, that during this past winter French homes have been practically unheated and thus the first concern of the authorities will be domestic heating.

Bombs Damage Few Plants

Fortunately, there is one factor in favor of speedy recovery. The plants themselves, which are fairly well distributed over locations of no strategic military importance, escaped thorough devastation by air bombardment. Although single factories have suffered some damage from the air, the complete breakdown of glass manufacture in 1945 was caused primarily by the disruption of transportation by the Allied Air Forces and the French Forces of the Interior.

Although it is true that improvements and major repairs were impossible during the war, production facilities have remained intact. The regeneration of the rail and trucking systems, a difficult responsibility but certainly one of highest priority, will probably restore most of the glass production at an earlier time than glass plant reconstruction would have permitted.

The immediate effect of bombardment, lack of raw material, abduction of personnel and occupation policies, is shown in Table 1:

TABLE 1

Indices of Activity of French Glass Industry on the Basis of 1938

Year	*Index (basis* 1938)
1938	100
1940	65
1943	56
Average Occupation	60
1944 (second trimester)	30
Liberation	almost 0
1945 Feb.	20
1945 May	about 50

Damages to specific plants have been reported to THE GLASS INDUSTRY as follows:

(1) (Probably) Destroyed: Lalique, the famous art glass factory, which was located near the Alsatian front.

(2) Heavily Damaged: St. Denis, the goblet and perfume bottle plant near Paris, during a bombardment in 1943.

Photo by French Press & Information Service

(3) Heavily damaged, but repaired soon afterwards: Glacerie de Boussois, Ampoule factory of Cristallerie de Givors.

(4) Damaged: Parra-Mantois, the optical works; St. Etienne, window glass; the bottle plant of Givors; Cristallerie Fougeraise, a hand plant making goblets.

All other plants remained undamaged or were damaged but slightly.

Production Figures 1943

An idea of the production losses and of the capacity of the French glass industry may be gained from the statistics which are available for the typical year 1943. These data are given in Table 2:

TABLE 2

Production 1943

	Tonnage	*Index based on* 1938	*Index based on maximum production*
I. *Flat Glass*			
Mirrors	6,931	21	11
Windows	45,875	120	38
Cast (Plate) Glass	25,226	91	21
Total (Average)	78,032	(79)	(27)
II. *Molded Glass*	817	35	9
III. *Fiber Glass*	3,681	1,438	29
IV. *Automatic Hollow*			
Bottles, Candy	115,274	44	24
Insulators	2,225	37	24
Green Containers	3,274	142	24
White Containers	11,226	307	94
Goblets	15,015	54	35
Perfume Bottles	23,806	53	31
Total (Average)	170,820	(50)	(27)
V. *Hand Made*			
Perfume Bottles	11,002	43	29
Goblets	5,838	37	28
Laboratory	619	98	28
Illumination	931	20	17
Industrial, Misc.	816	54	7
Ophthalmic (blancs)	1,337	247	100
Optical	114	128	50
Ampoules, Tubing electr.	3,653	95	21
Ampoules, Tubing, misc.	2,763	92	29
Buttons, Rod, etc.	402	46	18
Other	61	18	42
(Total (Average)	27,536	(48)	(28)
Grand Total (with some raw glass for fibers)	281,083	56	27

Personal and Organizational Changes

Under the German occupation, the reduced activities were carried out under the previous management, except in the case of strategical materials such as optical glass. The representative optical plant of Parra-Mantois (under the direction of Mr. Mathieu) was controlled by the German Air Force from 1940-42. From 1942-44, a not less strict control was maintained by Schott, Jena.

Many men of the glass industries were prisoners of the Germans or died for their patriotism. Mr. Daum, president of the Daum glass plants, well known by collectors of fine glass, and president of the Association of Hand Glass Plants, was an exemplary leader in the resistance movement. He died, a prisoner of the Germans, in 1944. His place in the organization was taken by Mr. Thouvenin, who is now visiting the United States.

Photo by French Press & Information Service

Mr. Olignet, manager of the Verrerie Charbonneaux, Rheims, was deported in 1944. The son of one of the partners of this firm, Mr. A. Charbonneaux, was killed by the Gestapo in October, 1943, on a Paris street.

Early this year, the Holophane plant was still without its director, three leading engineers and thirty-five employees, who had been held in Germany. Similar conditions were reported by Choisy-le-Roi.

In general, skilled workmen are missing not only because of the many wounded, killed or disabled, but also because even now many prisoners have not returned and many of those returned are unable to work after years of privation.

Under the authoritative state of Marshal Petain, the French glass industry, like other industries, was placed under the rule of directed economy. The activities of the glass industry were regimented by an Organization Committee (Comite d Organisation) headed by Mr. L. Barbier.

Under General De Gaulle's Provisional Government, this organization was first maintained to function as a body responsible for allocations and a just distribution for reconstruction. The Republic also confirmed Mr. L. Barbier in his office. In the management of their factories, however, the industrialists were immediately given a maximum of freedom and it is understood that, after the reports on which this article is based had been received, the Committee was reorganized as a part of the Manufacturer's Association and detached from the government.

Technology and Science

The shortage of material and the lack of personnel

(*Continued on page* 441)

CLASS FREIGHT RATE DEVELOPMENTS NOW BEFORE I.C.C.

Western railroads challenge the Commission that the record shows lawful or economic need for ruling. State governments and commercial organizations petition for reconsideration. Motor carriers request indefinite suspension of interim adjustment.

As of Saturday, May 15, 1945, the Interstate Commerce Commission issued an order to railroads to equalize freight rates on certain manufactured and miscellaneous goods throughout the United States east of the Rocky Mountains.

On Tuesday, May 19, the Associated Press correspondent in Washington filed the news with the comment that "the Commission's decision is generally conceded to be the most important in its history."

On Wednesday, the New York Times gave the story the front page left-hand spread, in parity with the news of the world war. It carried a "Special to the New York Times," the A.P. dispatch, a U.P. dispatch, and columns of direct quotes from the I.C.C. "Docket" 28300 and 28310.

That day stocks on the New York Stock Exchange "closed irregularly lower with motor shares weaker in dullest session in a week. . . . Bonds closed mixed with reorganized rails softest in smallest dealings in a month." (An article in a subsequent issue of the Magazine of Wall Street interpreted the market action to signify that railroad shares were "practically unaffected."

Opinion of traffic experts in the glass industry, as reflected in a report in the July issue of THE GLASS INDUSTRY was that the "glass industry will not be affected too seriously, at least for the time being."

The gist of the Commission's nearly 700-page opus was that railroads should ultimately adopt a single scale of rates for all "class freight," which category, in general, covers manufactured and miscellaneous goods. And, for an interim period to start August 30, 1945, later modified to November 30, 1945, it prescribed an increase of 10 per cent in class rates in the East and a decrease of 10 per cent in the South and West. It commented that "This will greatly reduce the difference in the levels of the class rate territories and will bring to a minimum the undue prejudice." This adjustment will not apply to so-called Mountain Pacific territory.

At present freight rates differ geographically primarily according to "Territories." There are five such Territories, easy to envision approximately as follows:

Draw a line North and South through Denver and you cut off the Mountain-Pacific Territory to the west. That leaves the part of the United States affected by the Commission's interim order. Now quarter this remainder with a line of longitude and a line of latitude intersecting at the confluence of the Mississippi and Ohio Rivers. The northeastern quarter (which Southerners refer to as "The North") is called the "Eastern" or "Official" Territory. The southeastern is called the "Southern." The western is called the "Western-Trunkline." And the Southwestern is called simply the "Southwestern." These territories are clearly visualized in the map accompanying this article.

Not only do these Territories (and certain Zones within them) have different rates for different items, but they have different rating classifications for identical items.

Hence, as an essential to equalizing the class freight rates, the Commission ordered the standardization of freight rating classifications. Since there are some estimated millions of point-to-point ratings—and only an estimated uniformity of about 60 per cent among the Territories involved—compliance with the Commissioner's order, including reclassification, recalculation and republication, is expected to take several years.

This overwhelming complexity is not solely man-made, but seems to be a phenomenon almost as organic as the infinity of patterns of snowflakes. Even if one starts with a layman's premise that there would be one rate for anything everywhere, the question of bulk versus weight immediately presents itself.

Historically such questions have presented extremely difficult rate-making problems. Their complexity was further compounded by considerations of quantity, notably carload versus less-than-carload lots; also by the type of freight car required; by the care required for the shipment and the risk involved; by the value of the goods and the ability of the shipper to pay; and by the vagaries of competition, chance and the human element.

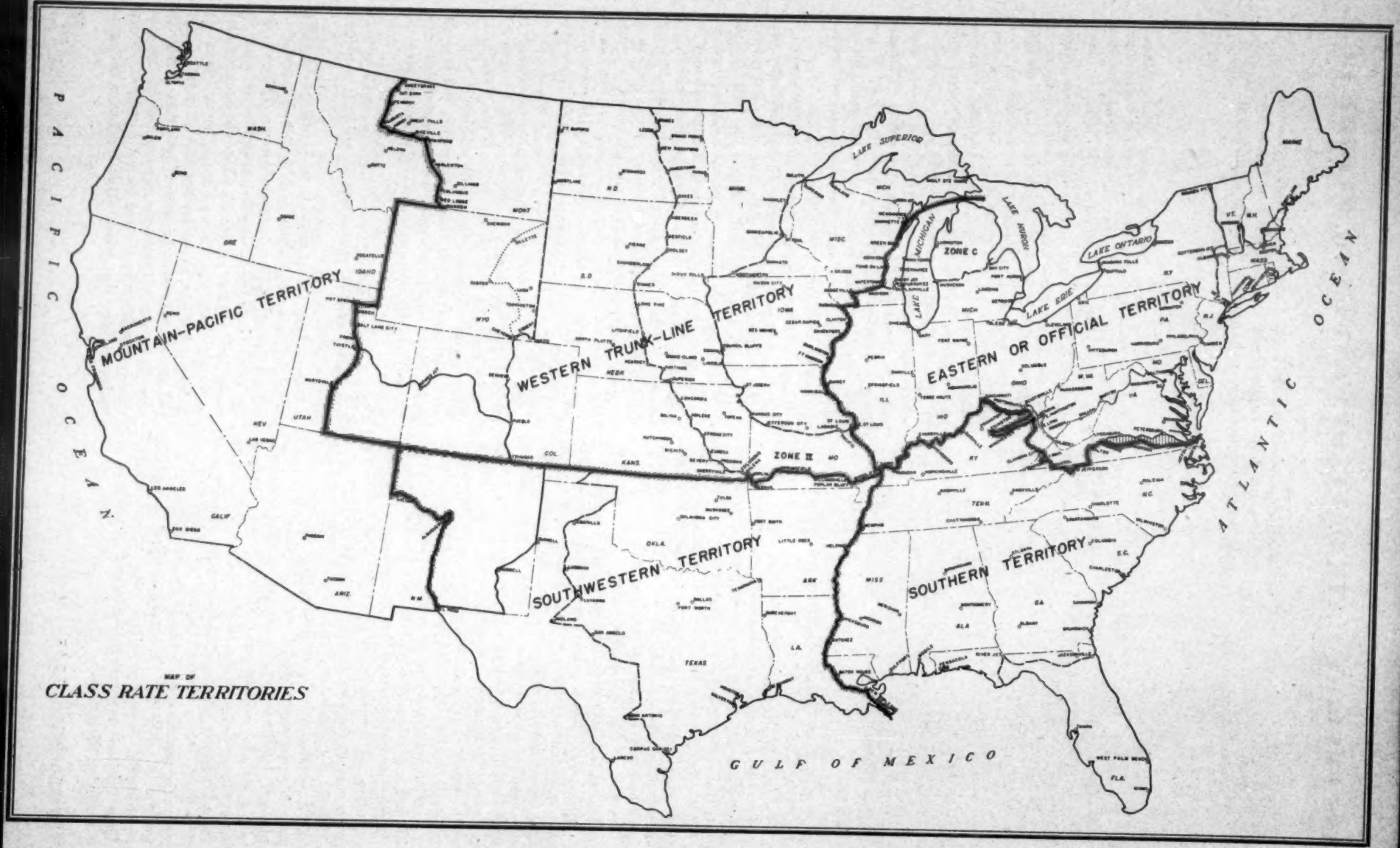
While it is interesting to speculate on the pattern of economic development which would have been fashioned by a system of freight rates as uniform as postal rates, it is obvious that any tendency toward uniformity implies a tendency toward industrial readjustment geographically.

The I.C.C. order has the effect of altering the pattern of economic geography. Governor Ellis Arnold of Georgia hailed it with the asseveration that "The I.C.C. decision, coming at this time, will enable the South to retain many of its war industries and in the post-war period become more industrialized, so that a wholesome balance between agriculture and industry can be maintained."

While this statement, read literally and carefully scrutinized, may not be an exaggeration, it may well have the effect of one.

Whereas the I.C.C. order is far-reaching in implied principle, its application is doubly limited in scope. It is limited, first, to class freight shipments. This excludes the vast bulk of commodity freight shipments, which include, for instance, practically all of the raw materials of the glass industry. On a weight or per-car basis, class freight is but a small percentage of all freight.

In the second place, the order is limited to class freight actually paying full rates. So many special reduced rates have been arbitrarily allowed for various shipments over various routes that most class freight moves under



MAP OF
CLASS RATE TERRITORIES

"exceptions." To these exceptions the I.C.C. order does not apply.

But the I.C.C. order, while not applying to exceptions, does take oblique cognizance of them with a remark about their "ever-increasing number."

According to an estimate published in the New York Times the total increase in the cost of shipping under the interim adjustment in the entire Eastern Territory for a year like the current year would be only about $18,000,000, and the total decrease in all other Territories only about $24,000,000. The basis for this computation is the Interstate Commerce Commission's Bureau of Transport Economics. Total freight revenue for 1941 was $4,509,760,000, and for the current year will probably be very much higher.

Spokesmen for the South and West, such as State Governors, have long agitated against alleged discrimination via freight rates against their local industries. Spokesmen for railroads have claimed, as at I.C.C. hearings, that the differentials of class freight rates reflected differentials in cost of hauling in the highly industrialized and concentrated Eastern Territory as against all other Territories. They also pointed out that the other Territories enjoy lower commodity freight rates. Shippers, meanwhile, have been sufficiently inarticulate or lethargic to elicit comment to this effect from the Commission.

In 1939 the I.C.C. undertook to investigate the rate structures east of the Rocky Mountains with a view to determining whether they caused "preference" or "prejudice" among the regions and, if so, whether said conditions were "undue."

Meanwhile the State of Georgia brought suit directly into the Supreme Court of the United States, charging violation of the anti-trust laws. Although the railroads argued for dismissal, the court accepted jurisdiction, despite the law that the I.C.C. has complete jurisdiction over railroad freight rates. In August 1944 the Department of Justice filed anti-trust action against 47 western railroads and 90 railroad and banking officials.

Last May 15, after about six years of deliberation and a series of hearings, the I.C.C. order pronounced the freight rate differentials as "unreasonable and unduly prejudiced."

"Just how much the pressure from political groups entered into the present ruling of the Commission is not known," said the New York Times editorially. "However, it must have been a factor."

Subsequent Developments

Railroad companies in all Territories have signified to the Commission that they will undertake to prepare a uniform classification of class freight rates for nationwide interstate commerce. In accordance with the Commission's recommendation that shippers and rate-making authorities of the States should be permitted to participate in the formulation of uniform classifications, the carriers plan to hold public meetings.

Western railroads have petitioned the Commission to set aside and reconsider the order to increase class freight rates by 10 per cent in the interim period. They maintain that it would unduly impair their resources and challenge the Commission that the record developed any lawful or economic need for it.

Eastern and Southern railroads have indicated that they will apply the interim rate adjustment but have petitioned the Commission to postpone the effective date from August 30, 1945 to March 31, 1946. The Commission has denied the petition but has postponed the date to November 30, 1945.

The governments of the New England States, New York, New Jersey, Pennsylvania, Maryland, Ohio and Indiana have petitioned the Commission to reconsider the interim adjustment order. So also have some 25 commercial organizations, including the Chicago Association of Commerce and the Association of Commerce and Industry of New York. If the petitions are denied, it is believed likely that the matter will be tested out in the courts.

The motor carrier organizations of the country have petitioned the Commission to suspend the prescribed interim adjustment indefinitely on the ground that the 10 per cent reductions will reduce rates which, it is claimed, are already below compensatory rates. This, the motor carriers maintain, will further jeopardize the already critical financial condition in which they find themselves.

AGA Meets to Discuss Problems

How the interim rate adjustment will affect one division of the glassware industry was reported in detail by the Traffic Committee of the American Glassware Association at a meeting on July 12.

According to a statement submitted by H. S. McCafferty, chairman of the committee, glassware and glass tumblers moving on a class rate in less carload traffic, and glassware with value exceeding $20.00 per cwt. will be accorded the new level of rates, that is, 10 per cent more in Eastern Territory and 10 per cent less elsewhere.

The order will affect no other rates, as all other items move either under exceptions or commodity rates. A possible anomaly is cullet, which is now rated specifically as a class item rather than a commodity and is not carried as an exception.

Prior to the meeting Mr. McCafferty had prepared a thorough analysis of the effect of the I.C.C. order and had checked it with vice-presidents of several of the major railroads in Eastern Territory. During the meeting, the Committee made provision for prompt action in the event of new developments.

Recent considerations in the matter of the proposed increase in rates and minimum weights on fiber board and boxes, fiber pulp board, etc., were reviewed and discussed. It was discovered that certain provisions of the proposal regarding minimum weights were palpably impracticable.

Specifications for packaging glassware containers received considerable discussion and it was announced that steps were being taken to protect shippers involved in damage to shipments. A variety of minor subjects were also threshed out and scheduled for definite action by the Committee.

• John E. Ohlson, Ch. E., has been appointed Senior Chemical Engineer of the Pennsylvania Salt Manufacturing Company, Philadelphia, Pa. Mr. Ohlson was formerly associated with Niacet Chemicals Corporation and Wyeth, Inc.

WAR ORDERS GO—VITAL SUPPLIES AGAIN AVAILABLE

On the seventh day after the end of the war, Government and Business met in Washington in an historic conference with the Press. The subject was the relaxation of government wartime control over business.

Government, represented by officials of the War Production Board, announced the elimination of all but a vestige of the priority system and scheduled September 30 for the abandonment of the Controlled Materials Plan.

Business, represented by officials of seven leading associations, applauded. The glass industry, and industry in general, were variously represented through the following associations; the Chamber of Commerce of the United States, the National Association of Manufacturers, the Committee for Economic Development, the American Trade Association Executives, the National Association of Purchasing Agents, the National Industrial Conference Board, and the Associated General Contractors of America, Inc.

On the previous day, the WPB had cancelled 210 of some 340 controls governing the quantities of materials available to industry and the uses to which they could be put.

Thus, according to a quasi-official estimate, about 85 per cent of wartime regulations governing production in the glass and other industries had been abolished. Chief among the materials remaining under control were textiles, rubber and tin. Chief among ratings still surviving were the AAA, for emergency action, and MM for the military.

To provide for breaking bottlenecks in materials needed for reconversion, and "to insure, when necessary, continual production and services," the WPB had provided for temporary use, if necessary, a new "CC," or "junior" civilian preference rating. Some of the materials of prime interest to the glass industry which were freed from control and some of the orders revoked are:

Chemicals—Arsenic compounds, barium chemicals (M-300, Schedule 31), cadmium sulphate (M-65), chrome pigments (M-370), cobalt oxide (M-21), copper chemicals M-300, Schedule 47), potassium carbonate (M-300, Schedule 85), zinc oxide (M-11-a).

Natural gas (U-7).

Oil.

Containers—Wooden shipping containers (L-232), fiberboard shipping containers (L-317) (the rating order, P-146, is still temporarily in effect), fiber shipping drums L-337).

Construction machinery—Conveyors and certain other machinery used in glass manufacture (L-192).

Paperboard—(Container board) (M-290).

Industrial wiping cloths (L-312)

Among materials still under control were sodium nitrate for suppliers, chromium chemicals until revocation of M-300, Schedule 62, on September 30, bismuth chemicals until revocation of M-300, Schedule 88, on September 30, and lead.

Order M-384, covering lead oxide, litharge and other lead derivatives, continues in effect and cannot be changed until Order M-38, the basic order controlling lead metal has been revoked. M-384 was amended August 3 to allow the use of lead derivative chemicals in the manufacture of glass and ceramics, as in the following paragraphs. The amounts specified are in terms of percentages and of pounds, whichever is greater. Amounts in percentages apply to the quantity of lead put into process for the manufacture of the same product for the same use during the first six months of 1944. Amounts in pounds apply to the calendar quarter.

Glass for Preferred use: Amount unlimited.

Glass—optical, chemical, electrical (including radio, radar and X-ray), industrial equipment, scientific equipment and signal—for civilian use: 50% or 1,000 lbs.

All other glass, for civilian use: 25% or 1,000 lbs.

Vitrified china tableware designed for institutional or mass feeding, for all uses: 50% or 1,000 lbs.

Ceramics—chemical, electrical and industrial—for all uses: 50% or 1,000 lbs.

All other ceramics, for all uses, 25% or 1,000 lbs.

In spite of the shortage of shipping containers, L-317 was revoked on the ground that it was not adaptable as a reconversion measure; if retained, it would have been a block to reconversion of hundreds of firms which have no quotas or whose quotas were restricted by war requirements that have disappeared.

Also revoked were the following containers and packaging orders: M-280, containerboard; M-251, pulpwood; M-351, waxed paper; M-380, moisture vapor-proof barriers; L-337, fiber shipping drums; L-336, paper cups and paper food containers; L-397, paper shipping sacks; L-232, wooden shipping containers; L-197, steel shipping drums; L-20, cellophane. The shipping container rating order, P-146, stays in effect with other "A" priorities until September 30.

Glass container order L-103-b is expected to be reduced to a conversion order restricting the use of tinplate caps as of October 31. Order L-103, standardizing glass container designs, is expected to be retained temporarily to maintain volume of glass products needed to pack civilian products.

Glass Items Removed from OPA Control

In accordance with the policy of dropping price controls on "products that are unimportant to the cost of living or the cost of business, whenever it is clear that dropping these controls will increase our ability to hold a firm grasp on the cost of living and the general level of prices," the Office of Price Administration, as of August 15, removed from price control the following items in which certain glass products are included.

Household accessories—Articles of glassware, china or pottery for decorative household use, except lamp bases, containers and articles for the preparation, storage and service of food and beverages. Artificial glass, plants, stems, buds, vines, fruits, flowers, petals, leaves and foods for decorative household use or window display.

Novelty and decorated serving trays.

Christmas tree ornaments except portrait photographs.

House number markers and holders.

Household art ware, such as book-ends, vases and smokers' accessories.

Household furniture—Furniture made entirely of glass.

Professional goods—Dental instruments and supplies

(*Continued on page* 444)

GLENSHAW REVIEWS ITS HISTORY ON 50TH ANNIVERSARY

The Glenshaw Glass Company had its inception during the year 1894 when several glass blowers conceived the idea of building a glass factory in Glenshaw, Pennsylvania, and entered into the blowing of glass containers. The principals involved consisted of two glass blowers of Sharpsburg, John A. Farrell and John B. Stehle; a hotel keeper of Sharpsburg, John M. Altmayer, and a butcher, J. J. Beck (later to become president from 1895 to 1930). The first glass factory was of frame construction and occupied a small parcel of ground leased from the Wittmer Ice Company, across the road from the present factory structure. The equipment consisted of a small day tank with sufficient tonnage to accommodate two blow shops, several sets of moulds, and ovens for annealing the ware. The factory was constructed in the fall of 1894 and the first glass was blown on January 7, 1895.

Many difficulties were experienced during the earlier days. First the day tank was found to be too small and did not melt sufficient glass and had to be enlarged. Later another furnace of the newer continuous type was built, but still production was not considered satisfactory from a standpoint of volume so that it became necessary to look for larger quarters for making necessary additions and improvements. Some time in 1899, property consisting of six and two-thirds acres of land was purchased and a new factory was planned and built with two continuous type furnaces and many new and improved annealing ovens, and this plant was put into operation in the spring of 1900. During the summer of 1900 the original factory was shut down and the plant dismantled.

The new plant was successful from the start, but it too ran into difficulties later on. The annealing ovens were all removed and replaced with the then most modern type of annealing lehrs. Furnaces were enlarged to take care of the expanding business, and everything seemed to be going along in good style when a real catastrophe struck on May 19, 1903. The entire factory building and warehouses full of ware, to take care of the summer shutdown, were burned to the ground without a cent of insurance.

Mr. J. J. Meyer, who was the general manager at this time and was the directing head since 1895, while shocked at the loss of everything he had, was not to be stopped. The principal stockholders in the company raised money wherever they could and risked their entire future in an attempt to rebuild their lost fortunes, and so three weeks to the day after the fire the plant was again in operation making bottles. It ran at peak production to the end of June 1903 when union rules required the shutting down of the plant until September 1.

All went well until March 3, 1904, when the company experienced its second catastrophe when most of its entire winter production stored in the open in the yards on account of lack of warehouse space was washed away in one of the worst floods experienced in the Pine Creek Valley.

Again the general manager and his close associates had to exhibit that rare variety of courage to continue the business in the face of this terrific loss, but they showed that nothing could daunt their spirits for they had the conviction that eventually they would become strong enough to overcome all odds. Money again was borrowed by the principals wherever it was obtainable.

The difficulties were not yet over. Again in September 1911 a second flood did considerable damage, and on December 17, 1917, the second factory building was burned to the ground and all machinery and equipment therein was destroyed. The prohibition amendment of 1918 was the next factor in shaking the stability of the company as practically all of its then existing business was beer and liquor bottles, and in addition to losing this business, all stocks of ware on hand were rendered worthless. Other fires occurred at later intervals but none of such catastrophic proportions as the fires and floods of 1903, 1904 and 1917.

The Company has always shown a disposition for progressive development and was more or less a pioneer in the development of machine bottle blowing. Starting out as a hand blown operation in 1895, machines were introduced about 1905 for pressing and blowing wide mouth containers. In late 1907 the first narrow neck bottle blowing machine was introduced in the Glenshaw factory. This was the first machine in the United States to make narrow neck bottles employing union labor the only other machine in existence at that time being Owens machine which was fully automatic, however, it was not available to other manufacturers. Bottle machines were bought and scrapped always in an attempt to get the best possible production with the least possible cost. In 1918, after the new steel and fireproof factory was erected, the first automatic feeding devices were introduced and as these were perfected additional feeders were installed and hooked up to the machines so that in a short time the making of bottles in the Glenshaw plant was a fully automatic process and later lehr loaders were added, making the operation automatic from the furnace through to the annealing lehrs.

Along with tank furnace improvements the mixing and storage of the raw materials came in for its share of the progressive development in the industry. In the earlier days the raw materials were unloaded from the railroad cars into the storage bins by hand, wheel barrow or truck. The raw materials were then weighed out by the mixers on regular platform scales and dumped on the floor, and turned over and over by hand many times in an attempt to thoroughly mix the ingredients. The batch was then shoveled into the furnaces by hand. In 1913 the first mechanical mixer, large elevated tanks

some distance from the floor with batch and raw materials elevators were installed so that the raw materials could be taken from the railroad cars mechanically, elevated to the proper storage bin, dropped by gravity to the mixing cars which also weighed the ingredients as they were dropped in. When thoroughly mixed dropped into a hopper for elevating to the batch bins in the rear of each furnace, without being touched by human hands. The mixing plant was again improved and rebuilt in 1937, and other improvements are in store to be completed as soon as the present emergency is over.

Over all of the fifty years of the company's existence its principal line of manufacture has consisted of beverage bottles of one kind or another. In the earlier days quite a large part of its output consisted of containers for food products, and at one time a goodly number of wide mouth food jars were made but in recent years the trend has been towards beverage bottles, with a part of its production devoted to food containers, including home canning jars and containers for cleaning and polishing materials.

Mr. J. J. Meyer, in addition to being its general manager, was Secretary and Treasurer of the company until his death in 1921. His son, Samuel B. Meyer, succeeded him as General Manager and still holds this position in addition to being President and Tresaurer.

Mr. J. J. Beck was Glenshaw's President from 1895 until his death in 1930, but did not become active in the management until 1910 when he gave up his business in the retail meat market. Mr. Alois Berner succeeded Mr. Beck as President of the Company in 1930 and retained the position until his death in January, 1939.

The present officers of Glenshaw are: Samuel B. Meyer, President, Treasurer and General Manager; Albert C. Meyer, Vice-President and Assistant Treasurer; George W. Meyer, Secretary, Assistant Treasurer and Assistant General Manager. The above, with Dr. J. Howard Beck, John A. Berner, Thomas A. Murphy and John W. Heinl, Jr., constitute the Board of Directors.

In its relations with labor the company has always shown a cooperative spirit and has gone out of its way in innumerable instances to more than meet labor half way. The company has never had any real labor disturbances.

The company has always put first in its consideration the welfare and future security of its employees. As early as 1917 a plan was initiated for group life insurance available to all employees with three months of service or longer, at no expense to the employee, the entire cost of the plan being borne by the company. The coverage of the plan was increased in 1936 whereby each employee was insured for $1,500.00 at a cost to the employee of 90c per month, and in 1943 the coverage on all employees was increased to $2,500.00 without any additional cost to the employees. In addition to this all foremen and employees with twenty-five years of service with the company were covered for $5,000.00 each without any extra cost on their part.

The company initiated group accident and sickness insurance for all employees in 1923 and it has been continued up to date without any cost to employees.

In December 1944, Glenshaw announced the adoption of a group retirement plan for its employees effective September 30, 1943. All employees with five years or more of service with the company as of September 30, 1943, and all other employees who have completed five years of service thereafter will be covered by the plan. The entire cost of the retirement plan is paid for by the company, without any contributions from the employees. The retirement age is 65 years.

Also initiated by the company in 1940 is a group hospitalization plan for the benefit of its employees with the understanding that the employees would pay the cost for whatever type of benefits they desired but that the company would solicit the subscriptions and handle the deductions and keep the plan in effect without any further charges to the employees. The company voluntarily enlarged the benefits under the plan during 1944 for which the company is paying now for the increased benefits.

The future can well be faced with its background of fifty years of conservative and progressive management, and post war planning will continue along the lines followed in the past, which showed a continual growth from the small day tank operation employing less than a score of employees, all hand blown operations, without machinery of any kind, to the present up-to-date factory with eleven operating automatic machines and full equipment, making more than one hundred seventy tons of finished glass containers daily, with a modern decorating plant, practically all buildings fireproof and a list of employees running upwards of four hundred. Annual sales are over three million dollars. There has been planned for the immediate post war period an additional bottle making unit consisting of furnace for five automatic machines, additional lehrs, raw material storage, mixing equipment and a new office structure.

The present management acknowledges the success of the enterprise to the faith and vision of its early founders, and especially honors and respects the memory of the late John Jacob Meyer, its general manager from 1895 to the time of his death in 1921, who laid the foundation for the business and without whose courage and unbounded faith the business could not have weathered the storms of the past. The management further feels that honor should be paid the memory of the late John Jacob Beck, and the late Alois Berner, whose wise counsel and abiding cooperation given to the management was a major factor in successfully overcoming many of the obstacles as they were encountered and in later years for the encouragment given the younger generation. The present stability of the company is a lasting testimonial to the progressive spirit, faith and courage of the early founders and pioneers, Meyer, Beck and Berner.

HARMON LEAVES UNIVERSITY OF ILLINOIS

Dr. C. G. Harman, formerly Assistant Professor of Ceramic Engineering at the University of Illinois, has accepted a position as Ceramic Engineer with the Locke Insulator Company of Baltimore, Maryland.

Dr. Harman received his B.B., M.S., and Ph.D. degrees in Ceramic Engineering at the University of Illinois. He has held positions at the Standard Sanitary Manufacturing Company, Iowa Engineering Experiment Station and Department of Ceramic Engineering. Dr. Harman has published about twenty-five technical papers.

INVENTIONS AND INVENTORS

A Summary of Patents of Interest to the Glass Industry Issued During July*

Feeding, Forming and Shaping

Otto H. Samuelson of Muncie and Anthony T. Zappia of Indianapolis received patent 2,379,830 for a plunger stem for operating the forming pin plunger of a parison mold of a forming machine, comprising a detachable guide sleeve secured to the forming pin plunger box, a plunger pin stem operating within the sleeve and having a hardened semi-spherical bottom end, adapted for engagement with the lowering and raising cam for the forming pin, and a piston ring surrounding the stem within the sleeve for forming a substantially air-tight junction between the stem and the walls of the sleeve.

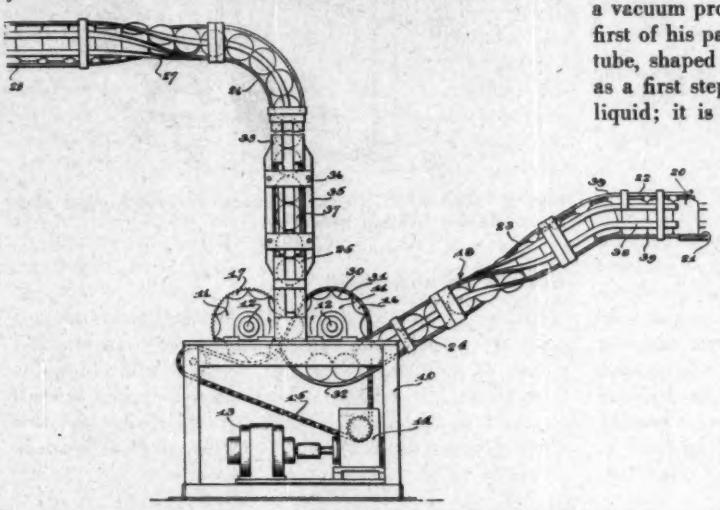


Fig. 1. Hohl, 2,379,713: Container conveyor with a pair of driving wheels with concave surfaces which pair up to grasp the ware and elevate it vertically in a continuous stream.

Miscellaneous Processes

Fig. 1 from patent 2,379,713 issued to John Hohl of Toledo and assigned to Owens-Illinois Glass Co. relates to apparatus for conveying or transferring glass containers from one position to another and for lowering and elevating them from one level to another during transfer. The containers are fed from platform 21 at the extreme right of the drawing and are moved in an unbroken line. The walls of the downcoming section 23 are spirally curved or twisted to swing the jars to a flat position. For their elevation a pair of driving wheels 11, in the form of a star, are so shaped as to have concave surfaces of a form corresponding to that of the containers. The curved slide 32 moves the line of bottles into such a position as will allow a concave surface on the right-hand driving wheel to grasp a container and carry it forward so that this concavity and a similar one on the other driving wheel may serve to lift the stream of bottles to a higher level.

Frank J. Cazzoli of Plainfield, N. J., received patents 2,379,342 and 2,379,343 for means of closing thin walled tubes after they have been filled with pharmaceutical preparations such as iodine. He explains that heretofore the tubes have been preformed with a relatively long stem portion through which the vessel is later filled by a vacuum process prior to sealing. In the method of the first of his patents, Mr. Cazzoli places the liquid in a tiny tube, shaped like a test tube with a fully open end, and as a first step heats a portion of the tube just above the liquid; it is then drawn out to capillarity and allowed to cool to allow the escape of any gases formed in the heating process; finally more heat is applied, the tube is twisted to close it, the top is drawn away and the twisted tip is beaded by fusing. The second patent describes a one man operated machine for closing tubes.

A sizeable group of patents was issued for closures for glass containers. Three assigned to Hartford-Empire Co. were 2,380,443 to Henry W. Ingle of Windsor, Conn., and Walter K. Berthold's two patents 2,380,395 and 2,380,396.

Glenn L. Dimmick of Indianapolis (R.C.A.) has obtained another patent on glass reflectors covered with films of zinc sulphide and a mixture of calcium fluoride and a compound of alumina. His other patents on this subject, one of which referred to the use of the mineral gearksutite, have previously been reviewed. He forms a dichroic reflector for use in sound recording apparatus.

Fig. 2 from patent 2,379,485 granted to Carl Herzog of Belleville, N. J., shows a rotary oven "adapted for baking articles such as glass articles" to gradually bring their temperature up and then to reduce it in such a way as to minimize strains. The oven turns about a vertically inclined axis and utilizes burners 19 which apply heat at the top. The ware is held in racks attached to the shaft, and is loaded and unloaded at one and the same point.

Patent 2,380,275 issued to John R. Turner, John H. McLeod and Glenn H. Bullock of Rochester, N. Y. (Eastman Kodak Co.) applies to apparatus for mechanically polishing glass optical elements, and particularly having a view of automatically controlling the supply of lubricant and abrasive during the operation.

*Certain of these patents were issued during June but work schedules in the U. S. Patent Office are so far from normal that it was not possible to obtain copies in time for review in the August GLASS INDUSTRY. Even then it became necessary to review certain patents by study of the *Official Gazette* only, and without having access to the complete patent as has been the normal practice in the preparation of these articles.

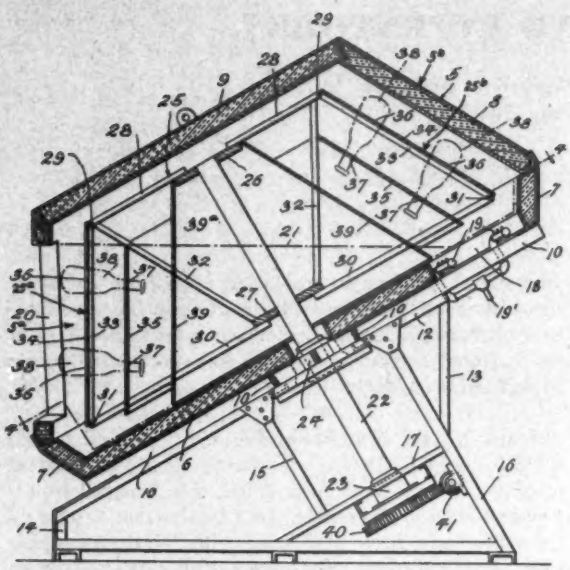


Fig. 2. Herzog, 2,379,485 : Rotary oven for glass containers carried on racks on an inclined shaft.

A method of sealing a thin walled receptacle having a thin metal wall section is described in patent 2,380,811 granted to Warren R. Walker of Forest Hills, N. Y., who assigned it to General Electric Co.

Sheet and Plate Glass

Patent 2,379,244 is one of two assigned to Pittsburgh Plate Glass Co. for frames for supporting sheet glass for movement into a furnace for heat treating. As shown in Fig. 3 for a curved sheet 45, there are supports 35 under the sheet and others 31 at the vertical edges of the sheet. The patent specification explains how each of these supports is pivotal in nature and so designed as to avoid stressing the sheet. The other patent bearing upon these problems is 2,379,213 granted to Lloyd V. Black of Tarentum, Penn. The supporting frame described by Mr. Black has a multiplicity of supports of very small cross section so as to minimize the exchange of heat. Also these elements of the frame are made of chrome-nickel-iron alloys of compositions so selected as to give substantially the same coefficient of expansion as that of the glass to be supported.

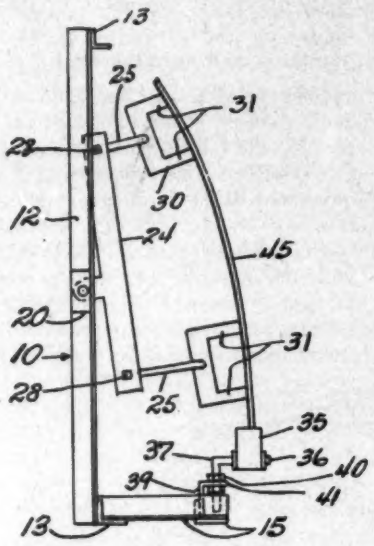


Fig. 3. Minton, 2,379,244 : Frame for supporting glass sheets during heating processes.

Glass Wool and Fiber

Clinton L. Savidge of Toledo (Mitchell & Smith Inc.) describes in patent 2,380,676 a means of branching the stream of molten glass or slag which is to be blown to form fibers. He utilizes a block which provides a small reservoir of molten material which spills over the side along grooves which direct it to the individual blowers.

ORGANIZATION CHANGES AT CORNING

Corning Glass Works recently made the announcement of four new appointments in connection with organization changes in the company's consumer products and technical products divisions and controller's department.

Eldon B. Sullivan, formerly chief of the cost systems and standards section, has been named Assistant Controller.

Otto W. Hilbert has been assigned as auditor in charge of internal auditing of all Corning's records and accounts.

The third member to receive a new assignment is Harry B. Turbett who will do special accounting work in connection with the company's proposed Canadian manufacturing plant at Leaside, Ontario. Mr. Turbett was formerly chief of the accounting section of the controller's department.

Carl F. Henkel, Jr., has been appointed manager of the optical sales department to succeed Dr. O. A. Gage, who recently retired after 25 years with Corning. Mr. Henkel previously assisted Dr. Gage in optical glass sales.

During Dr. Gage's twenty-five years with Corning, he was connected with the development of colored glasses, technical apparatus, filters, signal glass and optical glass parts that ranged in size from half-inch squares to the 200 inch telescope mirror. The actual manufacture of the disc was carried on under the direction of Dr. G. V. McCauley and Dr. J. C. Hostetter.

GLASS WALLS USED AS PROTECTION FROM DIRT

In the ligature division of Johnson and Johnson, makers of sutures, glass is being used as a wall-surfacing material in order to help maintain sterility which is a primary factor in the manufacture of sutures.

Libbey-Owens-Ford Glass Company's vitrolite was used to face the walls in this effort to provide sterile working conditions. Not only the rooms making the sutures are walled with vitrolite, but all other interior rooms of the building. It is regarded as one of the most modern factories in the country.

GJ Research Digest

Practical Interpretations of Glass Technology

The Strength of Glass Fibres

In the December, 1944, issue of *The Journal of the Society of Glass Technology*, J. B. Murgatroyd presents three papers dealing with the strength and brittleness of glass. In the first paper which deals with the elastic properties of glass fibres, the author finds that the value of Young's modulus and of the modulus of rigidity of glass fibres of stated composition decreases as the fibre diameter is reduced; and the viscosity of the glass also falls in value with the decrease in elastic moduli. Heating the fibres to 400° C. causes an increase in the modulus of rigidity, but not in Young's modulus, and on heating to 520°C. or higher, Young's modulus is increased as well as the modulus of rigidity. The viscosity of the glass is also increased by heat treatment.

Murgatroyd interprets these results as meaning that the process of drawing a glass fibre causes profound changes in the constitution of the glass. The suggested structure is such that long chains of molecules are formed lying parallel to the direction of drawing, and the lateral bonds between the chains are few. Heat treatment at low temperatures permits the formation of some lateral bonds, resulting in a stiffening of the structure. At the higher temperature levels, the chain structure should break up, but is prevented from doing so to the fullest extent by the dimensions of the very fine fibres. It is suggested that heat treatment should also cause a reduction in strength due to the formation of strong lateral bonds and the consequent loss of "ductility."

In the second paper which deals with the effect of heat treatment on strength, the author describes an apparatus for the rapid determination of the breaking strain of glass fibres. The effect of heat treatment on the strength is shown to follow the changes in the elastic moduli recorded in the first paper. The strength is reduced to about 70 per cent of the original value by heating to 400°C. for 30 minutes, and to about 50 per cent by heating to 520°C. for the same period. The distribution curves of the breaking-strain tests are in accordance with a random distribution of flaws in the fibres, and it is possible to indicate approximately the effect of increasing the area of the test piece on the strength. Heat treatment of the fibres is shown to cause changes in the distribution curves which are compatible with the appearance of a greater number of flaws as the elastic constants increase and the viscosity is raised.

The general conclusion reached is therefore that the great strength of fibres of glasses of the type described is due to a reduction in the severity of the flaws present in the glass; it is not possible to decide whether the most severe flaws are absent because they are not formed or because their frequency of occurrence is small. In either case, the fundamental cause is a constitutional change in the glass itself, and the observations are in agreement with the supposition that this change is from a rigid three-dimensional structure to a chain-structure with weak lateral bonds, and that this is not the most stable molecular configuration for a soda-lime-silica glass. Heat treatment causes changes in the constitution towards the more rigid structure with properties similar to those of the glass in massive form.

In his third paper, Murgatroyd discusses the mechanism of brittle rupture in glass. Griffith's "crack theory" and the weak molecular bond theory of the strength of glass are tested by strength phenomena recorded by different investigators and it is concluded that modifications are necessary to these theories to account for the facts. The suggestion is made that Griffith "flaws" consist of pockets of quasi-viscous material surrounded by larger three-dimensional aggregates, and that when the pocket material has yielded to an applied stress the fact that it then carries no load and makes the pocket the equivalent to a "hole" in the glass. Such a "hole" would act as a stress concentrator. In this way, the time elapsing before breakage occurs is explained as being due to the time required for the stress in the quasi-viscous material to relax. By means of a model representing the stress concentration at a pocket, an equation is derived relating the breaking strength, P_B, with time. Values of the breaking strength calculated from this equation, $P_{B-a} = \frac{b}{tk}$, are in good agreement with published experimental results.

Microstrength of Glass

Powell and Preston (*Journal of the American Ceramic Society*, June, 1945), show experimentally that if a minute area of a large piece of glass is tested for tensile strength, the stress supported is comparable with that of fine glass fibres, and is some fifty or one hundred times the "strength" of the large piece tested in any of the ordinary ways. The experimental method consists in pressing a small steel ball upon the glass surface, and so stressing, in tension, a minute annular zone around the circle of contact. Various types and compositions of glass were tested by this method. Determinations were also made of: (1) the microstrength as function of area stressed and (2) the microstrength as function of ball diameter and surface treatment.

It was concluded that: The microstrengths obtained by the pressure-cone method on large specimens are strictly comparable in magnitude with those normally obtained on fibres. This conclusion seems to establish the fact that the strength of fibres is largely due to their small size and not so much to orientation.

NEW EQUIPMENT AND SUPPLIES

NEW DOUBLE BUCKET CARRIER

The Cleveland Tramrail Division of the Cleveland Crane & Engineering Company, Wickliffe, Ohio, has developed a new motor-driven cab-operated double bucket carrier for the transportation of dry bulk materials.

The cab operator sits on a swivel chair which enables him to work in the direction of either bucket. A single variable speed drum controller is located on one side of the cab, but two foot brakes are provided so that one is always in convenient reach of the operator. Push-pull levers for opening the bucket gates extend into the cab and permit emptying the materials in any amounts and at any rate desired.

The unit illustrated has two 25 cu. ft. buckets and is designed for carrying a total load of two tons. The buckets are designed and located with reference to the tramrail arch beam rail to facilitate easy filling from overhead bins without interference or spillage.

NEW DECORATIVE DEVELOPMENT FOR GLASS

The research laboratory of the O. Hommel Company, Pittsburgh, Pa., has developed a product named, "Snowflake," which is said to increase the field of decorative possibilities on many glassware items.

Application is simple and requires no special equipment. A permanent satin finish can be obtained in ½ to 2 minutes. "Snowflake" has been used to decorate tumblers, vases, bowls, vials, architectural glass, window and plate glass. Samples will be sent upon request to the manufacturer.

DUST COLLECTOR

The latest addition to the line of individual, self-contained dust collectors presented by Aget-Detroit Company, 602 First National Building, Ann Arbor, Michigan, is the Model 1150 Dustkop dust collector. The new dust collector features an extra thick, flat filter instead of the familiar round type.

Model 1150, designed for individual use on wheel dry grinders, disc grinders, sanders, polishing and buffing equipment is equally adaptable to more than two wheels when the wheels are small and grouped close together.

Dust, dirt and lint from the source is drawn into the unit by a direct driven, non-clogging paddle wheel fan which is driven by a continuous duty 1½ hp. 3450 rpm motor. A cyclone separator contained within the unit separates most of the dust and grit out of the air streams.

The unit is available with motors for operation on virtually any type of power and can be supplied with inlet sleeves for various sized connections to one or more dust sources.

NEW EMERGENCY ALARM

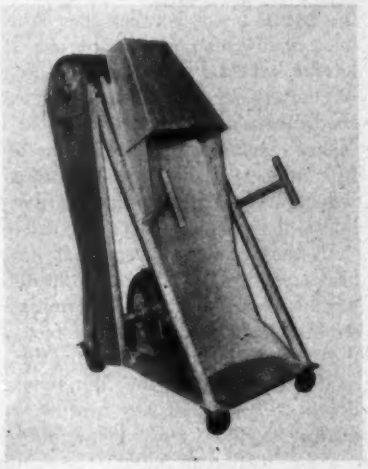
The Brown Instrument Company, Philadelphia, Pa., has added to its line of electronic air-operated controllers, a new safety emergency alarm to protect process equipment and materials.

The new safety alarm is known as the Brown Electronik Contact Controller. It operates automatically and provides on-off control in addition to air control to actuate motorized valves, solenoid valves, contacor panels, signal lights, etc.

As shown in the illustration of the Electronik and the contact controller, Contacts (A) and (B) are made or broken by the action of cam (C) and roller (D) and the spring loaded lever to which it is attached. The control point is set by loosening the knurled knob (E) and rotating cam (C), so that its notch corresponds to the position of the temperature pen that has been previously moved to the desired point. The pen position sounds the emergency alarm. A red pointer on the scale indicates the temperature setting of the contact controller.

RITCHIE BAG DUMPER

The ASCO Manufacturing Company, 601 South Anderson Street, Los Angeles 23, California, has announced the manufacture of the Ritchie Bag Dumper for lifting and emptying heavy bags. Operating on a ¼ horsepower



electric motor, the machine will quickly lift and empty bags weighing up to 350 pounds.

The Dumper features an automatic shut-off switch which stops the motor at top and bottom positions of the lift and, as an added safety feature, a special clutch arrangement disengages the motor if downward return of chute is obstructed. The upward lift takes ten seconds, with eight seconds to lower.

BROWN ACQUIRES NEW PLATINUM THERMOCOUPLE

The Brown Instrument Company, Philadelphia industrial instrument di-

vision of the Minneapolis-Honeywell Regulator Company, has acquired all patent rights from the Rustless Iron and Steel Corporation to a new platinum thermocouple, which provides practical and accurate results in measuring molten steel temperatures.

The thermocouple is described by Brown engineers as a device that, when used in conjunction with a Brown Electronik Recorder, measures within 45 seconds the temperature of molten steel even when the steel is covered with slag.

The thermocouple has two basic parts: an immersion head, comprising a platinum and platium-rhodium thermocouple encased in a fused silica tube mounted in a block of graphite, and a handle which is a 12-foot insulated pipe containing wires leading to the Brown Electronik Recorder.

COMPLETE LINE OF SPRAY BOOTHS AND DUST COLLECTING EQUIPMENT

Metallizing Engineering Company, Long Island City 1, New York, has recently released a complete line of metal spray booths and wet dust col-

lecting equipment, which has been designed, engineered and built for handling sprayed metal dust.

The line includes spray booths for exhausting to present exhaust systems, to the atmosphere or into a Metco wet collector. Features of the line are the lathes exhaust units, wet collectors and water wash spray booths. Metco spray booths include a sloping rear wall to eliminate eddies and recirculation, open type work table, down draft, dust trap and cleanout door. Bulletin 43A is available which describes the entire line.

CENTRALLY CONTROLLED BATCHING EQUIPMENT

Toledo Scale Company, Toledo 12, Ohio, features in the following illustration an application of automatic weighing and proportioning equipment used in a glass plant where ten scales are electrically interlocked through a central control panel.

The batching process begins with a flip of a switch and the operator can watch the progress of the complete operation by observing the signal lights on the panel.

The equipment is used for control of a single critical ingredient or complete control of several. Provision can be made for either rapid or dribble control and material can be fed onto conveyor belts or into gathering cars.

The system can be installed under a variety of operating conditions as the scale levers are especially designed to support weigh hoppers, weigh tanks or other load containers.

CATALOGUES RECEIVED

Pittsburgh Plate Glass Company, Color Engineering Department, 632 Duquesne Way, Pittsburgh 22, Pa., has released a 24-page, full color, illustrated booklet entitled, "Color Dynamics in Industry."

There are three basic objectives of scientific color use, as brought forth by the booklet: 1) to promote continuity of employment; 2) to improve efficiency of operation; 3) to maintain quality of production.

The purpose of the booklet is to illustrate how color can be a contributing factor in keeping absenteeism to a minimum and promoting better morale in the factory.

At the same time, the company has released a number of accompanying booklets featuring the same principle, but in relation to Hospitals and Institutions, Schools, Offices, Hotels, Clubs and Restaurants, Automobile Sales and Service Departments, and to the Home.

Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., has made available their new pocket-size booklet, "Pennsalt Industrial Chemicals and Specialties," which lists the industrial chemicals and specialties manufactured by Penn Salt and the Sales Division controlling them.

Fischer & Porter Company, 911007-C County Line Road, Hatboro, Pa., offers a third, revised edition of "A New Era in Flow Rate Measurement." The catalog contains 32 pages which discusses and illustrates the advantages of the rotameter for flow rate measurement.

Each basic advantage of the rotameter—its extremely high accuracy, its linear flow curve, its wide flow range, the ready visibility of the metering elements and fluid, the immunity of the Fischer & Porter Ultra-Stablvis rotameter to variations in viscosity and specific gravity—are clearly discussed and well illustrated.

Precision Equipment Company, 32 N. State Street, Chicago 2, Illinois, annonce the publication of an Industrial Buyers' Bulletin listing equipment ordinarily difficult to obtain but which the firm has in stock for immediate delivery.

The booklet lists equipment available for improving production, inspection and research facilities and net wholesale prices are shown for all items.

Lynch Corporation, Anderson, Indiana, has issued a booklet which shows the factory in which they manufacture the Lynch Glass forming machines.

Five different types of Lynch forming machines are illustrated and a descriptive folder on each model is available upon request.

Bailey Meter Company, Cleveland 10, Ohio, has made available an 8-page Bulletin, No. 83-C, entitled, "Bailey Thermo-Hydraulic Feed Water Regulators." Improved designs of thermo-hydraulic generators and bellows operated feed water regulator valves, suitable for feed lines ranging in size from ¾" to 6" inclusive, are described and illustrated.

Also included is a full page colored schematic illustration which demonstrates the thermo-hydraulic principle which is entirely self-contained requiring no outside source of power.

Industrial Products Company, 2820 N. Fourth Street, Philadelphia 33, Pa., has issued a pamphlet featuring full vision Respirator Hoods.

Included is an illustration of the Type GA-200 hood, together with listings of various other types, each with descriptive material.

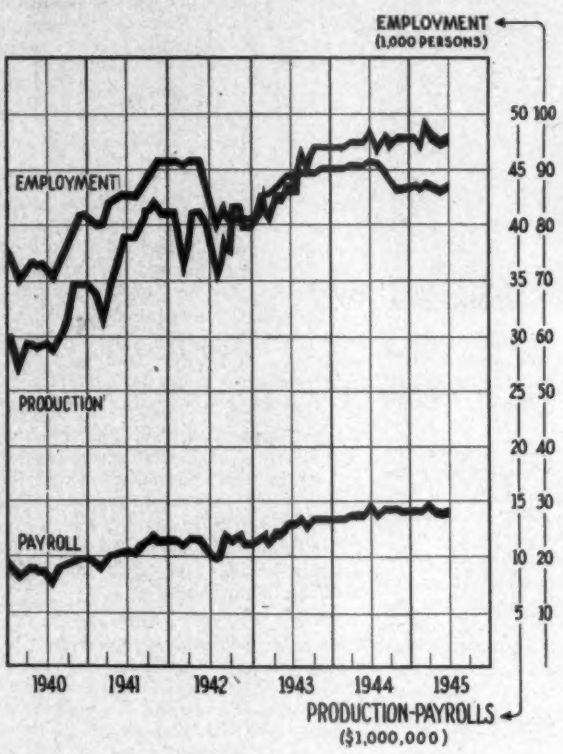
Fischer & Porter Company, 9110-A County Line Road, Hatboro, Pa., has released a new edition of their, "Theory of the Rotameter." It covers the history and technical development of the Area-type Flow Meters and the explanation of how their patented Ultra-Stablvis Rotameter overcomes the effects of viscosity and density in flow rate measurement.

Also included is the latest in technical and engineering data, together with many diagrams and illustrations.

CURRENT STATISTICAL POSITION OF GLASS

THE GLASS INDUSTRY'S INDEX

Monthly Trends Through June, 1945



Activity in the glass industry increased during June with the Production Index showing a total of $48,000,000 as compared to $47,000,000 for May. The June 1944 Index showed an amount of $49,000,000. Production for the first half of 1945 totals $286,000,000.

Glass container production for July totalled 8,643,174 gross which is a slight decrease from the figure reported for June and slightly more than 7 per cent over July 1944. Production for the first seven months of 1945 totals 59,503,784 gross. Production for the same period in 1944 was 59,349,614 gross.

Shipments of glass containers during July totalled 8,680,153 gross, which represents a decrease of approximately 4 per cent from the figure reported for June and an increase of slightly more than 11 per cent over July 1944. Total shipments for the period of January through July were 61,130,720 gross—an increase of approximately 15 per cent over the corresponding months of 1944.

Inventories on glass containers for July were 3,943,156 gross, about 1 per cent less than for June and slightly more than 22 per cent less than July 1944.

Plate glass production for July, reports the Hughes Statistical Bureau, was 8,480,895 sq. ft. This is a little more than 39 per cent above the June report of 6,081,137 sq. ft. July 1944 production was 8,246,148 sq. ft., which is about 2 per cent less than for July 1945. A total plate glass production of 56,962,022 sq. ft. is shown for the first seven months of 1945 as compared to 59,409,644 sq. ft. produced during the same period last year; 1945 is about 3 per cent less than 1944.

Due to a change in the method of computing the statistics covering production and shipments of automatic tumbler ware and manufacturers' sales of machine-made table, kitchen and household glassware, the following figures are only close approximations of the actual to-

(*Continued on page* 434)

GLASS CONTAINER PRODUCTION AND INVENTORY

(All Figures Are in Gross)

		Production July, 1945	*Stocks July*, 1945
Foods; Medical & Health Supplies; Chemical, Household, Industrials; Toiletries & Cosmetics	Narrow Neck ...	2,954,842	1,781,063
	Wide Mouth ..	2,609,480	926,179
Dairy Products		287,403	214,499
Home Canning		323,083	190,135
Beverages, Returnable		606,953	388,163
Beverages, Non-Returnable			
Beer, Returnable		502,667	86,919
Beer, Non-Returnable		376,810	44,589
Liquors		683,164	217,107
Wines		218,096	77,712
Packers' Tumblers		80,676	16,790
Total		8,643,174	3,943,156

GLASS CONTAINER SHIPMENTS

(All Figures Are in Gross)

Narrow Neck Containers

	July, 1945
Foods	806,408
Medical & Health Supplies	897,555
Chemical, Household, Industrials	611,355
Beverages, Returnable	561,000
Beverages, Non-Returnable	
Beer, Returnable	486,679
Beer, Non-Returnable	374,910
Liquors	647,404
Wines	192,607
Toiletries & Cosmetics	550,762
Sub-Total (Narrow Neck)	5,128,680

Wide Mouth Containers

Foods	2,141,130
Dairy Products	306,841
Home Canning	423,012
Medical & Health Supplies	237,837
Chemical, Household, Industrials	81,749
Toiletries & Cosmetics	123,666
Packers' Tumblers	87,599
Sub-Total (Wide Mouth)	3,401,834
Total Domestic	8,530,514
Export Shipments	149,639
Total Shipments	8,680,153

SPECIFY "GENERAL CHEMICAL"

...get modern chemicals for modern glass

In the post-war era, the practical yet dramatic values of modern glass for functional and decorative purposes will capture the consumer's imagination, with a resultant vastly increased use in redecorating and new home building.

Ever abreast of the modern trends in glass making, General Chemical research has developed new chemicals . . . fluorides, fluoborates and others . . . for the new needs of the day. They may find application in your operation. Why not investigate their potentialities now?

. . . For uniformity and purity in chemicals for etching, polishing, frosting, cleaning, and glass making . . . "Specify General Chemical."

FIRST IN FLUORIDES

Select Your Requirements From These General Chemical Products

Hydrofluoric Acid • Nitric Acid • Sulfuric Acid • Sodium Fluoride • Polyacid Fluorides • Fluoboric Acid • Ammonium Fluoborate • Potassium Fluoborate Sodium Fluoborate • Potassium Fluoride Aluminum Fluoride • Barium Fluoride Calcium Fluoride • Copper Fluoride Lead Fluoride • Magnesium Fluoride Nickel Fluoride • Strontium Fluoride Sodium Sulfate (Salt Cake) • Sodium Silicate • Sodium Metasilicate • Trisodium Phosphate

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

CURRENT STATISTICAL POSITION OF GLASS . . .

(*Continued from page* 432)

tals. It is expected that the publication of authenticated figures can be resumed next month.

Automatic tumbler production during July totalled 4,902,353 dozens, an approximate 13 per cent decrease from June and about 4 per cent less than July 1944. Shipments totalled 5,194,063 dozens as compared to 5,833,977 dozens for June and 5,434,147 for July 1944. This represents percentages of about 10 per cent under June and 4 per cent less than July 1944. Finished stocks on hand at the end of July were reported at 4,081,327 dozens in comparison with 5,440,121 dozens for July 1944.

Table, kitchen and household glassware: Manufacturers' sales of machine-made table, kitchen and household glassware for July were 2,161,550 dozens, in comparison with 2,767,019 dozens and 2,125,600 dozens reported for June 1945 and July 1944, respectively.

Employment and Payrolls: The number of people employed in the glass industry during the month of June was 88,400. May reports showed a total of 86,600 and June 1944 totalled 92,700.

Payrolls for June estimated $13,200,000—an increase of $200,000 over May. Glass manufacturers have paid out $83,200,000 for payrolls during the first seven months of 1945.

AMERICAN WINDOW GLASS ELECTS PRESIDENT

The Board of Directors of the American Window Glass Company has elected Albert S. Crandon as President of the company. Mr. Crandon succeeds William L. Monro, deceased.

Mr. Crandon joined American Window Glass Company in 1923 and held the positions of field engineer and assistant chief engineer. In 1937, he became associated with the Hartford-Empire Company and was active in furnace design developments and in the construction and operation service department.

In 1942, he rejoined American Window Glass Company in the capacity of executive vice president in charge of factory operations and was elected a member of the board to fill the vacancy caused by the death of Mr. Monro.

• Morton I. Dorfan has been appointed Manager of the dust and fume engineering division of the American Foundry Equipment Company, Mishawaka, Indiana. In this position, he will supervise and coordinate the company's expanded dust control sales, engineering and research activities.

Attention . . .

Glass Tank Operators

For Maximum Life SPECIFY

C · S · R

CAST SUPER REFRACTORY

For

Mantels, Feeder Parts, Tuckstones, Burner Blocks, Port Covers, Port Bottoms, Port Arches, Port Skews, Port Baffles, Lintels, Jambs, Bridgewall Covers, etc.

C.S.R. ***has excellent resistance to***

HIGH TEMPERATURES
CORROSION
SHRINKAGE
SPALLING

C.S.R. ***is***

VACUUM CAST
ACCURATE TO SIZE
UNIFORM TEXTURE
ECONOMICAL

•

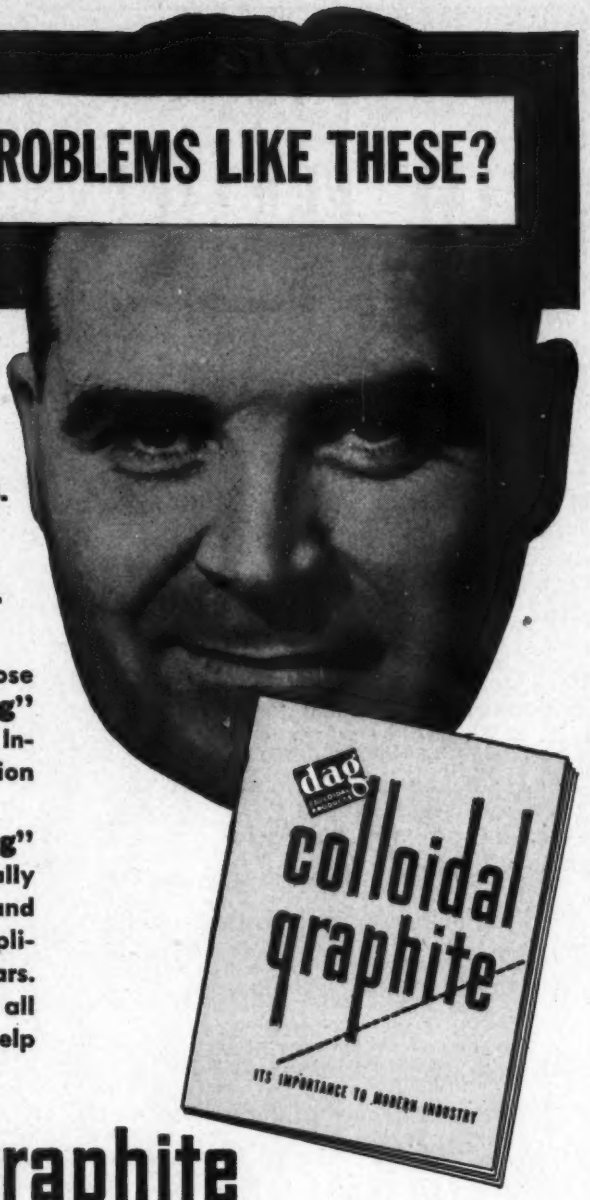
Write for Full Particulars

WALSH REFRACTORIES CORP.

High Grade Refractories for Over 50 Years

4070 NORTH FIRST STREET ST. LOUIS 7, MISSOURI

NEED SOLUTIONS TO PROBLEMS LIKE THESE?



- **Lubrication of Mold-Hinge Pins.**
- **Kiln Car Journal Lubrication.**
- **Stainless Lubricant for Glassworking Tools.**
- **Lubricant for Ground Glass Joints.**
- **Lubricant for Bearings Operating in Hot Air.**

SOLUTIONS to many of your problems like those checked above will be found in the booklet "dag" Colloidal Graphite—Its Importance to Modern Industry . . . available on request without obligation by simply mailing the coupon below!

As an industrial trouble-shooter, versatile "dag" Colloidal Graphite (not a single product but actually many products in one) has a number of unusual and valuable applications. A good many of these applications are recent developments of the war years. If you are not absolutely certain that you know all of these later applications—and how they may help *you*—let a 3¢ stamp bring you up to date.

dag colloidal graphite

ACHESON COLLOIDS CORPORATION, Port Huron, Michigan

TO GET THESE:

This new literature on "dag" colloidal graphite is yours for the asking:

- **430** A general booklet on the story of "dag" colloidal graphite. 12 pages profusely illustrated.
- **440** A complete list of "dag" colloidal graphite dispersions with applications.
- **421** "dag" colloidal graphite for ASSEMBLING AND RUNNING-IN ENGINES AND MACHINERY.
- **422** "dag" colloidal graphite as a PARTING COMPOUND.
- **423** "dag" colloidal graphite as a HIGH TEMPERATURE LUBRICANT.
- **431** "dag" colloidal graphite for IMPREGNATION AND SURFACE COATINGS.
- **432** "dag" colloidal graphite in the FIELD OF ELECTRONICS.

MAIL THIS JML Co. A-J1

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN DEPT. J-7

Please send me, without obligation, a copy of each of the bulletins checked:

No. 430 ☐ NAME _____
No. 440 ☐ POSITION _____
No. 421 ☐ FIRM _____
No. 422 ☐ ADDRESS _____
No. 423 ☐ ZONE No. _____ STATE _____
No. 431 ☐ OUR PRESENT OIL SUPPLIER IS _____
No. 432 ☐ (Lubricants containing "dag" colloidal graphite are available from major oil companies.)

GLASS TANK FURNACES

again available

The constant demand for this useful and informative book has necessitated another printing.

Glass Tank Furnaces is the only book in the English language dealing comprehensively with glass tanks. Its contents include and describe in simple language, the most modern practices in design, construction, operation, behavior and economy of glass tanks. It is a book for the factory man, the technologist and for all who are interested in the practical aspects of glass making.

Glass Tank Furnaces contains 105 figures and illustrations—75,000 words typed in two columns and produced by the lithoprint process. Cloth bound, price $3.50. Foreign $4.00, F.O.B.

The edition is limited—Send the coupon now.

THE GLASS INDUSTRY
55 West 42nd Street
New York 18, N. Y.

Date .....

Please enter my order for.....copies of Glass Tank Furnaces at $3.50 per copy.

Name.....

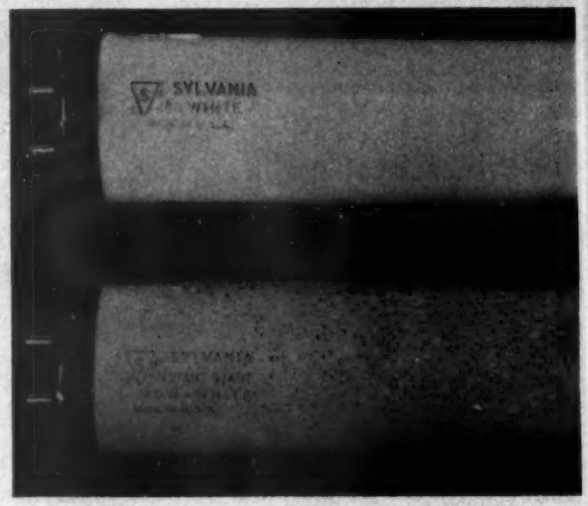
Company.....

Address.....

.....

NEW INSTANT-START FLUORESCENT LAMP

Sylvania Electric Products, Inc., of Salem, Mass., has introduced a new instant-start 40 watt, T-12 fluorescent lamp. The new lamp is especially designed to operate with instant starting type of ballast and is specially treated to eliminate operating faults frequently encountered in conditions of high humidity.



Designed to operate in a two-lamp compensated ballast circuit, the lamps provide 450 volt operation without affecting light output, life or other features of standard 40 watt fluorescent lamps.

Humidity, frequently the cause of bad starting in instant-start types, will not affect operation of the new lamps as they are supplied with special invisible hydrophobic coatings which cannot be rubbed or scratched off and effectively prevent the formation of a film of moisture.

The lamp illustrated at the top of the above photograph shows untreated lamp after receiving fine spray of water which has produced continuous film of water. This is in contrast with the treated lamp shown below on which moisture has collected in tiny droplets, each separated from the other by a completely dry area. They are not interchangeable with standard 40 watt fluorescents, but have the same ratings.

PITTSBURGH SECTION SCHEDULES MEETINGS

The Pittsburgh Section of the American Ceramic Society is preparing to hold its first meeting at East Liverpool, Ohio, on Friday, September 14.

The group will meet at the Traveller's Hotel at 12:30 P.M. Arrangements are being made for an inspection trip through several district potteries after which the group will then proceed to the East Liverpool Country Club for golf and barbecue dinner.

At the same time, the Section is getting under way with plans for the Fall Meeting which will be held at Mellon Institute on Friday, October 12. Eight to ten papers, covering the various interests of each division of the Society, are being scheduled.

The Technical Session will be followed by a dinner and dance and other entertainment at the University Club. The full program is expected to be announced by September 1.

LOOK TO THE FUTURE *Thru Glass!*

Glass Fabrics

that won't shrink, stretch, burn or mildew

Here is another epoch-making accomplishment in high-grade glass with revolutionary chemical and physical properties—GLASS FABRICS.

Today, glass textile fibers twisted and plied into yarn are used for weaving tapes, cloths and other fabrics. They are used for electrical insulation, to reinforce plastic laminates, as a base for coated cloth, for chemical filtration. Soon, these fabrics will be widely used as decorative fabrics—fabrics that will not shrink or stretch, mildew or decay and that are fireproof.

A few of the new types and forms of high-grade glass derive some of their characteristics through the use of SOLVAY Potassium Carbonates. Their outstanding superiority of granulation and purity are acknowledged by glass manufacturers. If you have an idea for new high-grade glass, consider these high-grade SOLVAY Potassium Carbonates.

"Fiberglas" Cloth

FOR HIGH GRADE GLASS *Buy These High Grade*

POTASSIUM CARBONATES

By SOLVAY

Calcined Dustless Potassium Carbonate 99-100% K_2CO_3

Granular Hydrated Potassium Carbonate 83-85% K_2CO_3

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 RECTOR STREET **NEW YORK 6, N. Y.**

BRANCH SALES OFFICES:

Boston • Charlotte • Chicago • Cincinnati
Cleveland • Detroit • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

A.S.T.M. DEFINITION OF GLASS . . .

(*Continued from page* 417)

considered, any mention of materials could be limited to silica and the basic oxides added respectively as fluxes and to produce durability. Since alumina, boron oxide, and other acidic oxides are often present in the common glasses, however, much additional verbiage would be required to include all the occurring oxides. When some special glasses are considered, for example, the phosphate or tantalate glasses, further listings would become necessary. Although the great bulk of all glass manufactured is composed of oxides, other binary compounds such as fluorides and chlorides may be present. For all of these reasons, the broad designation "inorganic" is used without further chemical limitation.

Fused silica itself, in a state of high purity, constitutes an important glass for many technical purposes because of its low expansibility and other favorable properties. Therefore, any definition of glass describing it as a mixture of oxides would need to be qualified to admit this uncontaminated oxide. Fused silica (fused quartz, "Vitreosil") meets the present definition squarely, as the patent attorneys would say. Other single oxides may be fused and cooled without crystallizing. Few, if any, of them are now of commercial importance, but they would meet the specification.

". . . Product of fusion" describes broadly, without reference to temperatures, the process by which glass must be made. It indicates the necessity of bringing the material into a liquid condition. Nothing is offered as to the relative fluidity of the melt, nor is any mention made of the gradual and continuous increase in viscosity that finally results in rigidity. These considerations are beside the point in defining engineering materials that are to be used at ordinary or only slightly elevated temperatures. This is not to deny that molten glass deserves its name. An extended paragraph, at least, would have been necessary for a complete description of the behavior of hot glass and its changes during cooling, and none of this would have been germane to the purpose.

The final clause in the basic definition: ". . . that has cooled to a rigid condition without crystallizing", was left in this form after some debate in the committee. Having in mind the facts of partial devitrification and the formation of crystallites from substances purposely introduced to cause translucency or opacity, some of the members were in favor of the expression ". . . without major crystallization". Devitrification is a rare defect; glasses containing crystallites are in a small minority; a glass must be held distinct from a crystallized substance as a prime concept. For these reasons, the crystals, if present, were finally regarded as suspended in the glass matrix, and treated in one of the amplifying paragraphs.

In the first of the paragraphs supplementing the essential definition, those properties of glass are recognized which give rise to some of the favorite similes of everyday speech: hard as glass; brittle as glass. Conchoidal fracture is mentioned, because it is typical of the way a mass of glass breaks; the broken surface has no cleavage planes, no crystal facets, nor fibrous tearing. The curvature of the broken surface may not be apparent, because of long radius; it is there, nevertheless.

Lest anyone should think that glass is necessarily or even fundamentally transparent and colorless, although virtual transparency and colorlessness are the useful characteristics of glass in most of its commercial applications, this paragraph (a) announces its wide range of transmission for light and broadly outlines the causes. Perhaps brevity has been attained at the cost of clarity in the expression "transparent to opaque," but few readers will miss the meaning. The abbreviated style of mineralogy texts has been used. Possibly some readers might prefer: "Transparency of glass may range from zero to 100 per cent, and may vary for different wave lengths, thus producing color or infrared or ultraviolet absorption, when different elements enter into its composition." Space is not available for this encyclopedic treatment.

The remaining paragraphs, (b) and (c), need no explanation. The one merely allows the use of descriptive terms, understood by trade custom, without departure from the essential or basic definition. The other remarks a common figure of speech, naming an object by the material of which it is made.

Morey,[2] after a painstaking review of ancient and modern concepts of glass, develops a definition which is thoroughly accurate and adequate from the scientific point of view: "A glass is an inorganic substance in a condition which is continuous with, and analogous to, the liquid state of that substance, but which, as the result of having been cooled from the fused condition, has attained so high a degree of viscosity as to be for all practical purposes rigid. The present definition, for reasons already given, abridges and condenses Morey's careful statement concerning the condition of glass by simply saying: ". . . cooled to a rigid condition without crystallizing."

[2]G. W. Morey, *"The Properties of Glass,"* Reinhold Pub. Co., 1938; p. 34.

LACLEDE-CHRISTY ELECTS NEW OFFICERS

As a result of a recent meeting of the Board of Directors of Laclede-Christy Clay Products Company, John L. Cummings has been elevated to the position of Vice President and Director of Sales and Julius A. Kayser was elected a Vice President and made General Sales Manager.

Mr. Kayser has served the company for twenty-two years in the capacities of Research Ceramist, Plant Superintendent, Divisional Sales Manager, Chief Refractories Engineer and Assistant Vice President.

Harvey R. Hiller was appointed an Assistant Vice President. He has been District Manager of the Chicago territory and is in charge of sales in the Wisconsin, Michigan, Northern Illinois and Indiana territories.

John W. Rogers was also appointed an Assistant Vice President. Mr. Rogers has been Sales Manager of the Glass Refractories Division and is continuing in that position.

• V. C. Swicker, formerly on the engineering staff of Hartford-Empire Company and for the last year associated with Alexander H. Kerr & Company, Inc., Santa Ana, California, will resume his connection with Hartford-Empire, September 1. Mr. Swicker will be engaged in glass research and service work carried on by Hartford in cooperation with its licensees.

GLASSWARE WITH A PAST . . . PRESENT . . . FUTURE!

Design rings the bell when it's right. Color-designs on glassware—decorations that *sing*—have had a brilliant past, are having a brilliant present today—and will have an astonishing future! Clever design and matchless colors are your bet for big glassware sales tomorrow.

Ready to help you win these sales will be Du Pont Colors and Decorations. Alkali-resistant colors that are rich and smart—so durable they stand up under many washings. Acid- and sulfide-resistant colors, for all-over glassware decoration in table and kitchen ware and a host of other uses. And, to speed production, look for the improved Du Pont Squeegee Oil that simplifies screen deposition of multi-color designs and labels.

We'll keep you informed on availability and new developments. And we'll work with you in selecting the right materials and the right procedures best suited to your needs. For more details, just write E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.

BUY MORE BONDS

YOUR FUTURE LIES IN EXPORT!

- A healthy post-war business will be in large part an export business — are you prepared to take advantage of foreign markets?
- At no expense to you, we are in a position to promote and distribute your goods abroad, pay cash for your merchandise in the U. S.
- **WE RELIEVE YOU OF ALL RED TAPE ON SHIPPING SPACE, GOVERNMENT RESTRICTIONS, CREDIT RISKS, FOREIGN LANGUAGE COMPLEXITIES, AND DETAILS OF EXPORT DOCUMENTS AND SHIPPING.**

AMONG THE COUNTRIES IN WHICH WE ARE REPRESENTED:

South and Central America
England
Sweden
Portugal
Switzerland
Union of South Africa
Trans-Jordan
Iran
Iraq
Egypt
Cyprus
Syria
Palestine
Iceland
Ceylon
Turkey
Belgian Congo

PLAN YOUR ALLOTMENTS TODAY FOR POST-WAR SALES.

Detailed information will be promptly forwarded upon receipt of your inquiry without obligation.

DANCO
CORPORATION
99 HUDSON STREET • NEW YORK 13, N. Y.

NEW APPOINTMENTS IN WESTINGHOUSE LAMP DIVISION

Three new appointments have recently been made by the Westinghouse Lamp Division in Bloomfield, New Jersey. Henry B. Ahlers has been named an assistant on the staff of the company's Lamp and Lighting Divisions and will handle special assignments in cost and expense control. Mr. Ahlers has been connected with the accounting department of the Lamp Division's New York office.

Dr. Albert Brann, who has been a specifications and standards engineer, was named Manager of the division's specifications and standards department. He joined Westinghouse in 1918 as a chemist.

The third appointment was the assignment of Paul B. Tully as Assistant Manager of lamp manufacturing. Mr. Tully has been associated with the company since 1923 and has served as student engineer and supervisor of lamp development.

FIBERGLAS HALTS CONVERSION OF KANSAS CITY PLANTS

The August issue of THE GLASS INDUSTRY reported plans of the Owens-Corning Fiberglas Corporation to convert two plants in Kansas City to fill Navy requirements for the superfine fibers which were to be used to replace kapok used in life jackets.

The Japanese surrender has eliminated the Navy's need for this material and conversion of the two plants has been halted.

Plans for a large-scale commercial production of superfine fibers is awaiting completion of studies of potential civilian uses of the new material.

MECHANICAL PROPERTIES OF BARE AND COATED GLASS FIBERS . . .

(*Continued from page* 418)

If δ is the relative deviation of the mean value for a particular fibre, and v the number of fibres tested, then

$$H = 0{\cdot}674\left[\frac{\Sigma\delta^2}{r(v-1)}\right]^{\frac{1}{2}}$$

is the "standard deviation". $\Sigma\delta^2$ means the sum of the squares of all the δ values. For bare filaments, for $v = 80$, the value of H was 0.0179, and for filaments coated with a vinylite resin H was 0.0132.

The smaller spread of values for coated fibres could be demonstrated also by plotting the frequency distribution curves, i.e, the curves the abscissa of which is the ultimate tensile strength, and the ordinate the percentage of samples having the strength plotted on the abscissa. The frequency distribution curves for coated fibres were steeper than for uncoated fibres. This held also for rubber-coated filaments although their mechanical behavior was otherwise similar to that of bare fibres.

Only tentative explanations could be advanced for the results obtained. The diminution of the ultimate tensile strength of fibres by organic coatings was attributed to a lowering of the surface tension of the glass caused by substituting polar resins for air. The augmented extensibility might be due to the resistance which the resin filling a surface crack offers to its wider opening.

THE FRENCH GLASS INDUSTRY, 1940-1945 . . .

(*Continued from page* 420)

have generally discouraged any technical progress in the period 1940-45.

Two exceptions deserve mentioning:

(1) The increase of fiber glass production.

(2) The electrification of glass furnaces.

Of historical significance are the deliberate actions of the occupation forces preparatory to the dis-industrialization of France in favor of Germany. This policy is documentated in the reports of the optical company of Parra-Mantois. Improvements in production were prohibited during the occupation and the manufacture of better grade ware gradually transferred to the Reich. Very ordinary glass was the official product of this specialized plant in 1942-1944, and most of it was exported to neutrals and the allies of Germany. These records contain proof that the ultimate goal of this procedure was a German monopoly of optical glass. The term "official product" is used because in 1945 it became evident that France had stocked a considerable amount of secret optical glass production for herself, thus testifying against the efficiency of rule by force.

A pleasant outgrowth of these sad years in France was the recognition of the necessity of scientific collaboration. The foundation of a Glass Institute was conceived in 1944 and its direction entrusted to the able scientist and inventor, and friend of many glass technologists in this country, Mr. Bernard Long. Details concerning this project were reported in last month's issue of The Glass Industry.

MATHIESON REORGANIZES RESEARCH DEPARTMENT

In line with a recent reorganization of its Research Department, The Mathieson Alkali Works has announced the following changes in personnel.

Maurice C. Taylor, formerly Manager of Research at the Niagara Falls Laboratories of Mathieson, has been appointed Resident Director of Research and Development. J. Douglas MacMahon has been named Assistant to the Technical Director.

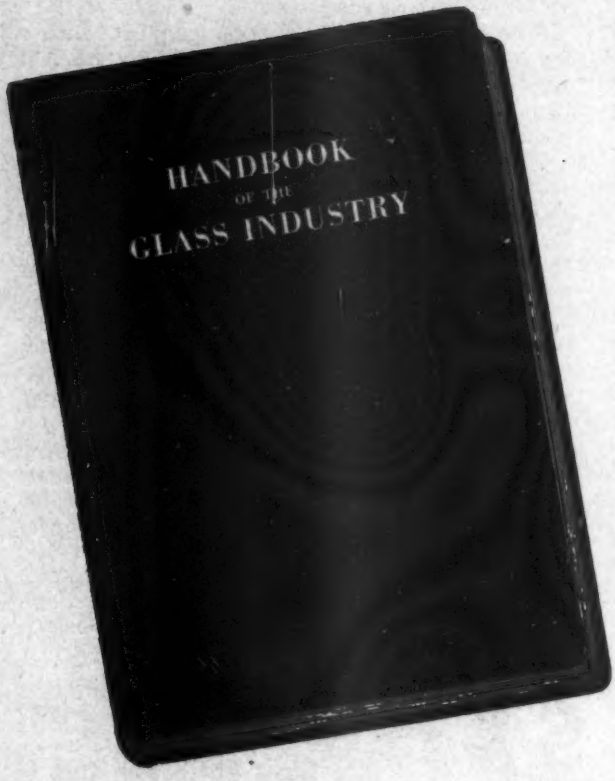
Mr. Taylor has been associated with the company since 1919 and has served in the capacities of research chemist, Chief Research Chemist, Assistant Director of Research and Manager of Research. In his new post, Mr. Taylor will consolidate all departments of research and development.

Mr. MacMahon, with Mathieson since 1922, has developed several patents covering applications of Mathieson products. His new post puts him in direct charge of production development as applied to both new products and improvements in present products.

At the same time, the appointments of C. N. Richardson as Manager of Research Engineering, and C. Gerald Day as Research and Plant Liaison Engineer, were announced. Both men have been with Mathieson for many years.

It's DUST-SEALED!
Mix Glass Batches in this Modern Dust-Sealed Mixer
Promote the HEALTH and EFFICIENCY of your employes by mixing glass batches in a modern Smith Tilting Mixer. It's DUST-SEALED during the entire mixing cycle — no chance for dust or vapor to escape. A sealed charging chute and a sealed rectangular shaped discharge "dust boot" confine both dust and vapor within the mixer drum, thereby effectively eliminating the silicosis hazard. The famous Smith duo-cone drum, with its scientific mixing action, insures uniform batches, improved quality of glass and greater production. Backed by 44 years' specialized experience in mixer design and manufacture. Write for Catalog.
THE T. L. SMITH CO.
2898 N. 32nd Street, Milwaukee 10, Wis.
SMITH
Glass Batch MIXERS

HANDBOOK of the GLASS INDUSTRY



Now $3.50

• The first printing of the Handbook of the Glass Industry has become exhausted and the continued demand for copies has resulted in a second binding.

Through printing economies obtained by a lowered unit cost in the second printing of the Handbook we are able to offer this useful, ready reference glassman's handbook at the *reduced price of $3.50 per copy.*

The Handbook of the Glass Industry is the only quick ready reference glassman's handbook for g e n e r a l factory manager, superintendent, combustion engineer, chemist, department foreman and every glassman regardless of his title or job.

The supply of this second binding is nearly exhausted, so may we suggest that you enter your order now!

THE GLASS INDUSTRY
55 West 42nd Street
New York 18, N. Y.

Date.....

Please enter my order for.....copies of the Handbook of the Glass Industry at $3.50 per copy.

Name..... Company.....

Address .....

.....

NEW MICHIGAN ALKALI DIVISION MANAGER

Edward Heiser was recently appointed to the post of Manager of the Cincinnati office of the Michigan Alkali Division of Wyandotte Chemicals Corporation.

Mr. Heiser joined the New York sales department of the then Michigan Alkali Company in 1927, was later transferred to Detroit and has been a member of the Chicago sales force for the past two years.

He succeeds G. T. Robinson who has been transferred to Chicago to manage J. B. Ford Division sales in the mid-western area.

NEW OFFICERS FOR SOCIETY OF CHEMICAL INDUSTRY

The American Section of the Society of Chemical Industry has announced the election of Francis J. Curtis, Vice President of Monsanto Chemical Company, to the office of Chairman, and Sidney D. Kirkpatrick, Editor of Chemical & Metallurgical Engineering, to the office of Vice Chairman, to serve until July 1946.

Other officers elected were Cyril S. Kimball and J. W. H. Randall who were reelected Honorary Secretary and Honorary Treasurer, respectively. New members of the Executive Committee are W. J. Baeza, G. J. Esselen, C. N. Frey, R. Heggie and N. A. Shepard.

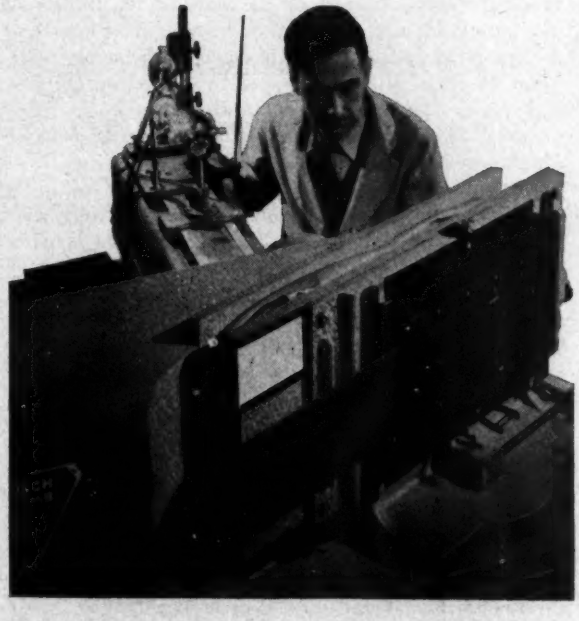
FPC TO HEAR ARGUMENT ON GAS RATE CASE

The Federal Power Commission will hear the oral argument with regard to the reasonableness of rates for natural gas, subject to its jurisdiction, sold by United Fuel Gas Company, Warfield Natural Gas Company, Cincinnati Gas Transportation and Huntington Development and Gas Company. The argument, originally scheduled for September 12, will be held before the Committee on September 14 at 10 A.M.

The Commission denied requests of the respondent companies for a postponement of not less than 60 days beyond September 12. The present order provides that argument must be concluded not later than noon, September 15.

The Commission's order of June 12, 1945, stated that oral argument is desirable in view of recent decisions of the Supreme Court in Federal Power Commission cases involving Colorado Interstate Gas Company, Canadian River Gas Company, Colorado-Wyoming Gas Company and Panhandle Eastern Pipe Line Company.

• George I. Finley, Jr., has been appointed Efficiency Engineer of the Glass Division, Pittsburgh Plate Glass Company. Mr. Finley has served with the company for 15 years.



BAUSCH & LOMB

ESTABLISHED 1853

How to Find Gold... At the Rainbow's End

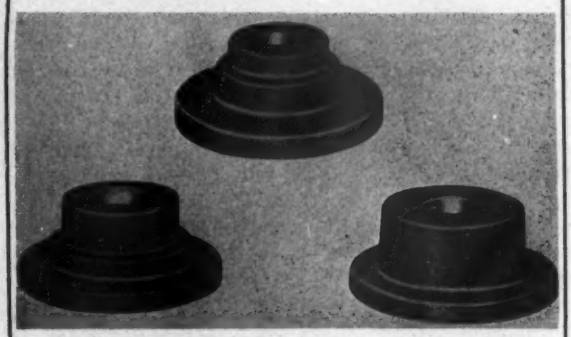
This is the instrument that proved the old tale about the pot of gold at the end of the rainbow. This is a modern Bausch & Lomb Spectrograph. To probe the secrets of the universe it makes use of the same principles of light that cause the rainbow.

With such instruments science has discovered many of the elements of the 92 out of which matter is composed, so unlocking vast storehouses of wealth for the enrichment of all. From spectrographic discoveries have come lifesaving armor and improved implements of war for our fighting men. Similarly, in your laboratories Bausch & Lomb Spectrographs can supply the vital information necessary for the creation of better products for the peace time future.

Consult Bausch & Lomb concerning your post war optical requirements. Pacing the advances of science, building the instruments that help to create new sources of wealth for all mankind, America's Leading Optical Institution is ready to serve you. Bausch & Lomb Optical Co., Rochester 2, N. Y.

Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry, Eyesight Correction and Conservation.

Gunite's Standard Grade A
for
Guide Rings



Like all Gunite glasshouse castings Standard grade A is used for guide rings because it is best adapted to this particular purpose.

There is a suitable Gunite Alloy for every type of glass mould part requirement. Miller plungers and guide rings, neck ring sticks.

Write us for details

GUNITE
FOUNDRIES CORPORATION
ROCKFORD ILLINOIS

BORAX
and
BORIC ACID
99½-100% PURE
CAUSTIC SODA
NITRATE OF POTASH SULPHUR

OTHER STAUFFER PRODUCTS

*Aluminum Sulphate	Cream of Tartar	Sulphuric Acid
Borax	Chlorine	Sulphur Chloride
Boric Acid	Muriatic Acid	*Superphosphate
Carbon Bisulphide	Nitric Acid	Tartar Emetic
Carbon Tetrachloride	Silicon Tetrachloride	Tartaric Acid
Citric Acid	Sodium Hydrosulphide	Titanium Tetrachloride
*Copperas	Stripper, Textile	

(*Items marked with star are sold on West Coast only.)

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL CO.
420 Lexington Avenue, New York 17, N. Y. 555 South Flower St. Los Angeles 13, Cal
221 North LaSalle Street, Chicago 1, Illinois 636 California Street, San Francisco 8, Cal
424 Ohio Bldg. Akron 8, O. Orlando, Fla. North Portland, Oregon Houston 2, Texas

WAR ORDERS GO —

(*Continued from page* 424)

for use by dentists, including, but not limited to, forceps, pliers, handpieces, scalers, elevators, impression compounds, etc., but not including fixtures and dentifrices. Scientific optical instruments (except those covered by RMPR No. 136 and binoculars, monoculars, field glasses and photographic equipment).

In explanation of this order the OPA said: "Articles such as Christmas tree holders and ornaments are made in extremely wide varieties and specifications. 'In-line' pricing is difficult and as the articles are of a seasonal nature, the volume of administrative work in a few months of the year is entirely out of proportion to the total volume sold and the significance of the articles in the cost of living.

"The order exempts from price control 'articles of glassware, china or pottery, for decorative or household use except lamps, vases and articles for the preparation, storage and service of food and beverages.' Illustrative of the type of articles included in this are candle sticks, vases, console sets, glass toilet articles and ornamented and novelty glass and china ware. Many of such articles are to a great degree objects of art for which prices are dependent on the skill of the maker and the amount of decoration rather than utility. Much of this type of merchandise is primarily gift ware.

COLOR STANDARDS FOR AVIATION LIGHTS

In the following item, which appeared in the July, 1945, issue of the *Technical News Bulletin* of the National Bureau of Standards, the work of the Bureau in developing 14 sets of filters to be used in controlling the colors in aviation lights is described in some detail. Many of these filters were used by inspectors of glass and plastic ware used by the Government in lights mounted on aircraft or set up at landing fields, some of which were located close to battle fronts.

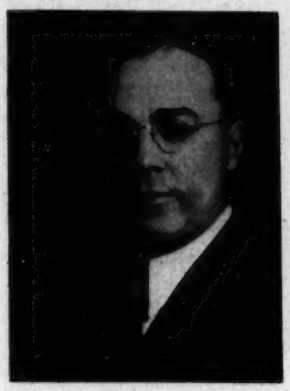
Airplane operations at night are controlled by radio and lights. So far as it is possible to do the work with lights, the pilot prefers this method because it is more direct. The controlling of flight involves a variety of problems, such as prevention of collision in the air, navigation of aircraft along airways, identification of landing areas, guidance of aircraft along approachway and runway during landing and take-off operations, and direction of aircraft on the ground while taxiing.

Lights for so many purposes must be of different colors. The present colors in use by the Army, Navy, and Civil Aeronautics Administration require the use of two types each of red, yellow and green, and one type of blue and lunar white, as well as units without colored ware. In order to prevent lights of different colors from being confused, a careful restriction of the variation of the several colors is necessary.

The Bureau has completed the standardization of 14 sets of filters to be used in controlling the colors of aviation lights. These filters were prepared by the Corning Glass Works with the technical assistance of the Bureau. Ten sets of 18 glasses each have been standardized for the Army Air Forces. The remaining sets, which contain 9 filters each, will be used by the Civil Aeronautics Administration.

NEW AMERICAN GAS ASSOCIATION DIRECTOR

H. Carl Wolf has been elected Managing Director of the American Gas Association, effective October 1, 1945. Mr. Wolf succeeds Alexander Forward who has served in the capacity of managing director since 1923. Mr. Forward is retiring from active business.



Mr. Wolf has been associated with the Public Service Commission of Maryland, Central Public Service Corporation, Consolidated Electric and Gas Company and Central Indiana Gas Company.

In 1938 he was elected president of the Atlanta Gas Light Company and until recently served as president of the Mobile Gas Service Corporation and Florida Public Utilities Company. He has been a director of the American Gas Association since 1941 and in 1942 was appointed chairman of the Association's National Advertising Committee.

DATE SET FOR AMA CONFERENCE

The American Management Association's 1945-46 packaging conference will be held this year on September 18 and 19 at the Hotel New Yorker in New York City.

Last year's Packaging Exposition and Conference was cancelled because of the travel restrictions in effect at that time. This will be the first meeting held by the Association's Packaging Division since March, 1944.

T.I.I.C. OPENS WAY TO LEARN GERMAN GLASSWARE PROCESSES

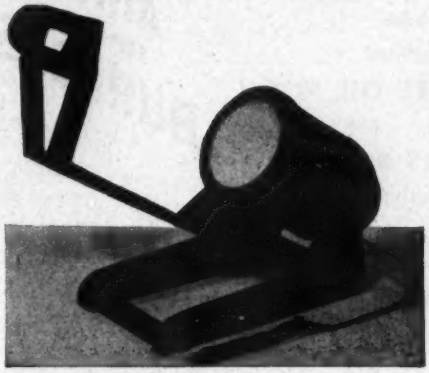
To comply with a recently expressed desire of Washington authorities that U. S. industry learn as much as it can about the scientific and technical methods employed by Germany prior to and during the war, a committee has been formed to be known as the Technical Industrial Information Committee. The committee is composed of U. S. and British military and naval officers.

Teams composed of American and British technical men have been collecting a vast amount of technical production information with the definite objective of obtaining details on a specified process, method or formula.

The glass industry now has the opportunity of requesting information on specific technical questions regarding German manufacture of glass. In asking for information, you must state very specifically what you want to know on formula, method, process or special machinery on the manufacture of a definite type or piece of glassware.

Send your requests to the Department of Commerce in Washington, D. C., which is the liaison between industry and the T.I.I.C. These industry requests will then become objectives of teams in Germany and other conquered enemy countries. If the information requested is not already at hand from previous projects, it will be sought if the T.I.I.C. believes the request worthy of investigation.

A NEW MODEL
POLAROID*
Glass inspection polariscope



Polarizing field is of 6" diameter. The analyzing eyepiece is located 14" from the polarizer. The eyepiece is a rectangle 3¼" x 1" with a facility of vision far greater than any unit made previously by us. It can be swung to any position from the vertical to the horizontal.

Send for descriptive bulletin

THE POLARIZING INSTRUMENT CO., INC.
41 EAST 42nd STREET NEW YORK CITY, 17
*T.M. Reg. U.S. Pat. Off.

EVAPORATED *metal films* CORPORATION
OF ITHACA

Reflect Now!

ON YOUR SPECIAL MIRROR NEEDS FOR THE *FUTURE!*

We at Ithaca have been making front-surface mirrors of CHROLUMINUM and semi-transparent mirrors of DUOLUX for the last ten years. They have come to be recognized throughout laboratories and industries as the *standard* of hardness, brilliance, and permanence.

EVAPORATED METAL
FILMS CORPORATION
ITHACA, NEW YORK

For
33 YEARS
we have
specialized in
FUEL OIL
and
GAS BURNER
manufacture for all types of industries, including many Glass and Ceramic plants.

NATIONAL AIROIL BURNERS
FUEL OIL - GAS

If you have a combustion problem perhaps we can provide a solution.

NATIONAL AIROIL BURNER COMPANY, INCORPORATED
1255 East Sedgley Avenue
PHILADELPHIA 34, PENNA.
ESTABLISHED 1912 INCORPORATED 1917

Hommel Glass Colors

Acid Resisting—for table and laboratory glass ware.

Alkali Resisting—brilliant and opaque qualities are retained after repeated washing in strong alkali solutions. For beverage and milk bottles.

Sulphide Resistant—unaffected by the toughest atmospheric conditions, a longer brilliant life for outdoor signs.

Ices—A permanent crystalline finish of sparkling beauty.

Gold—Liquid Bright Golds, Brown Golds, Powder Paste Golds, Liquid Burnish Gold. Made to give maximum adherence and wearing qualities under your production conditions.

Squeegee Oil—Hommel squeegee oils have proved to be the best under all conditions . . . sharp prints . . . clear screens . . . stable colors . . . no bleeding . . . no disagreeable odors. Write for samples.

Equipment—Spray guns—Brushes—Grinding Mills—Banding Wheels—Every Decorating Supply you need.

Chemicals—Everything you use from the Batch Plant to the Decorating Lehr.

Write or wire today.
We want to tell you more about our colors.

O. HOMMEL CO.
600 FOURTH AVENUE
PITTSBURGH 30, PENNA.
World's Most Complete Ceramic Supplier

WYANDOTTE NAMES RESEARCH DIRECTOR

Effective August 1, Dr. Thomas H. Vaughn assumed his duties as Director of Research of the Wyandotte Chemicals Corporation. Dr. Vaughn has been Assistant Director for the past six years and replaces Howard F. Roderick who has been transferred to special assignments with the sales department of Michigan Alkali Division of Wyandotte.

Mr. Roderick and Dr. Vaughn have been responsible to a great extent for the expansion of the Wyandotte Research Laboratories to include 15 sections.

NORTH AMERICAN PHILIPS APPOINTS GENERAL COMMERCIAL MANAGER

The North American Philips Company, Inc., has announced the appointment of Louis J. Chatten to the post of Vice President and General Commercial Manager, effective September 1. Mr. Chatten recently resigned as Director of the Radio and Radar Division of the WPB in Washington.

Mr. Chatten has formerly been connected with Dictograph Corporation, Fada Radio & Electric Corporation, Motor Parts Company and Bendix Home Appliances. He joined the WPB in July, 1943.

WICKWIRE ELECTS VICE PRESIDENTS

Wickwire Spencer Metallurgical Corporation announces the election of A. G. Bussman and L. D. Granger to the positions of Vice President as a result of a recent Board of Directors meeting.

Mr. Bussman has been associated with the company since 1930 and, in addition to his new assignment, is in Charge of Sales of the Wickwire Spencer Steel Company.

Mr. Granger also serves as Vice President of the American Wire Fabrics Corporation, which is a Wickwire Spencer subsidiary.

WESTINGHOUSE ACQUIRES B. F. STURTEVANT COMPANY

The Westinghouse Electric Corporation has recently announced the acquisition of the B. F. Sturtevant Company of Boston, Mass. The Sturtevant Company has been a pioneer in the design and manufacture of air handling and processing equipment.

The company will operate as the B. F. Sturtevant Company, a Division of Westinghouse Electric Corp., becoming a wholly-owned Westinghouse subsidiary. The new management will become effective about September 1.

• The Foxboro Company, Foxboro, Mass., has recently assigned Clarence L. Williams to its staff of sales engineers to cover the northern New Jersey territory. Mr. Williams will have his headquarters at New York.

THE ARTHUR S. WATTS SCHOLARSHIP FUND

The Ohio State University Development Fund recently announced the establishment of the Arthur S. Watts Scholarship Fund. It was created by the alumni of the classes of 1914 through 1941 of the Department of Ceramic Engineering to honor the long and meritorious service of Professor Watts as Professor and Chairman of the Department and to express their appreciation of the interest and counsel extended to them during their college and professional careers.

At the Ohio State Ceramic Alumni dinner held during the 1942 Annual Meeting of the American Ceramic Society, Professor Watts was presented with a complete set of office furniture and a bound volume of testimonial letters. The balance of money contributed, $1,500, was deposited with The Ohio State University Development Fund for the establishment of this Scholarship.

The total amount now in the fund is $3,300 and when it reaches a principal that brings an annual interest of $300 per year, the Scholarship will become operative.

The Arthur S. Watts Scholarship will be awarded annually to the ceramic engineering student who is deemed most worthy and who shall have completed his Junior year. The choice will be made by a committee consisting of the Faculty of the Department of Ceramic Engineering, the Dean of the College of Engineering and the Chairmen of the Departments of Metallurgy and Mineralogy. The recipient will be judged on scholarship, financial need, aptitude and other qualities that might predict a successful career as a Ceramic Engineer.

THE SHARP-SCHURTZ COMPANY

CHEMISTS AND CONSULTING ENGINEERS

FOR THE GLASS INDUSTRY

LANCASTER, OHIO U. S. A.

CLASSIFIED ADVERTISEMENTS

DEVELOPMENT ENGINEER
MACHINE DESIGN

Only man with successful practical background considered. State experience, salary desired, splendid postwar prospects. Plant in Peekskill, N. Y.
Box 647, 217—7th Ave., New York, N. Y.

DESIGNER-DRAFTSMAN
TOP NOTCHER

Automatic Machine Construction. Small Company Peekskill, N. Y. Splendid Postwar Prospects. Submit qualifications, references, salary desired.
Box 636, 217—7th Ave., New York, N. Y.

COLOMBIA AND PANAMA MARKETS

Manufacturers' Agent with United States references offers complete Sales Representation for Colombia and Panama Republics, on commission basis, to manufacturers of table glassware in general, all kinds of bottles and glass containers, window glass, furniture mirrors, glass building blocks and the general line of glass and glassware. Air mail address: LUIS FERNANDO PRADA, Carrera 52 No. 70-220, Barranquilla, Colombia Republic, South America.

WANTED by large reputable glass manufacturer in Pittsburgh area — Technical Foreman with practical operating experience, including handling personnel, to take charge of batch mixing, continuous and day tank furnace operation utilizing natural gas; also familiar with design and repair of furnaces. Some glass control laboratory experience desirable, but not essential. Address Box 21, The Glass Industry, 55 West 42nd Street, New York 18, N. Y.

MACHINIST — All Around

to work and supervise precision shop Peekskill, N. Y.; build machines; design and make molds. Splendid postwar prospects for top notcher. State full details, experience, salary desired.
Box 643, 217—7th Ave., New York, N. Y.

FOR SALE

2—Air Compressors—14 x 10. Single cylinder, belt driven with Rockwood Drive, 50 H.P. motor, 220 V. 60 cycle, 3 phase, 410 ft. displacement at 235 rpm.; 1—Air Compressor—8 x 8, single cylinder, Belt driven with Rockwood drive. 32 H.P. motor, 220 V. 60 cycle. 3 phase. 138 ft. displacement at 300 rpm. An extra set of reconditioned valves with each machine. Buck Glass Company, 841 E. Fort Avenue, Baltimore 30, Maryland.

GAS·AIR·OXYGEN
BURNERS
ECONOMIZERS
MIXERS
GLASS ROLLERS
GENERAL GLASS WORKING EQUIPMENT
Glass working equipment manufacturers: glass ampules, vials, etc. Glass working lathes, bench fires and laboratory equipment of all types. Write for catalog
CHAS. EISLER
EISLER ENGINEERING CO.
742-50. 13th STREET